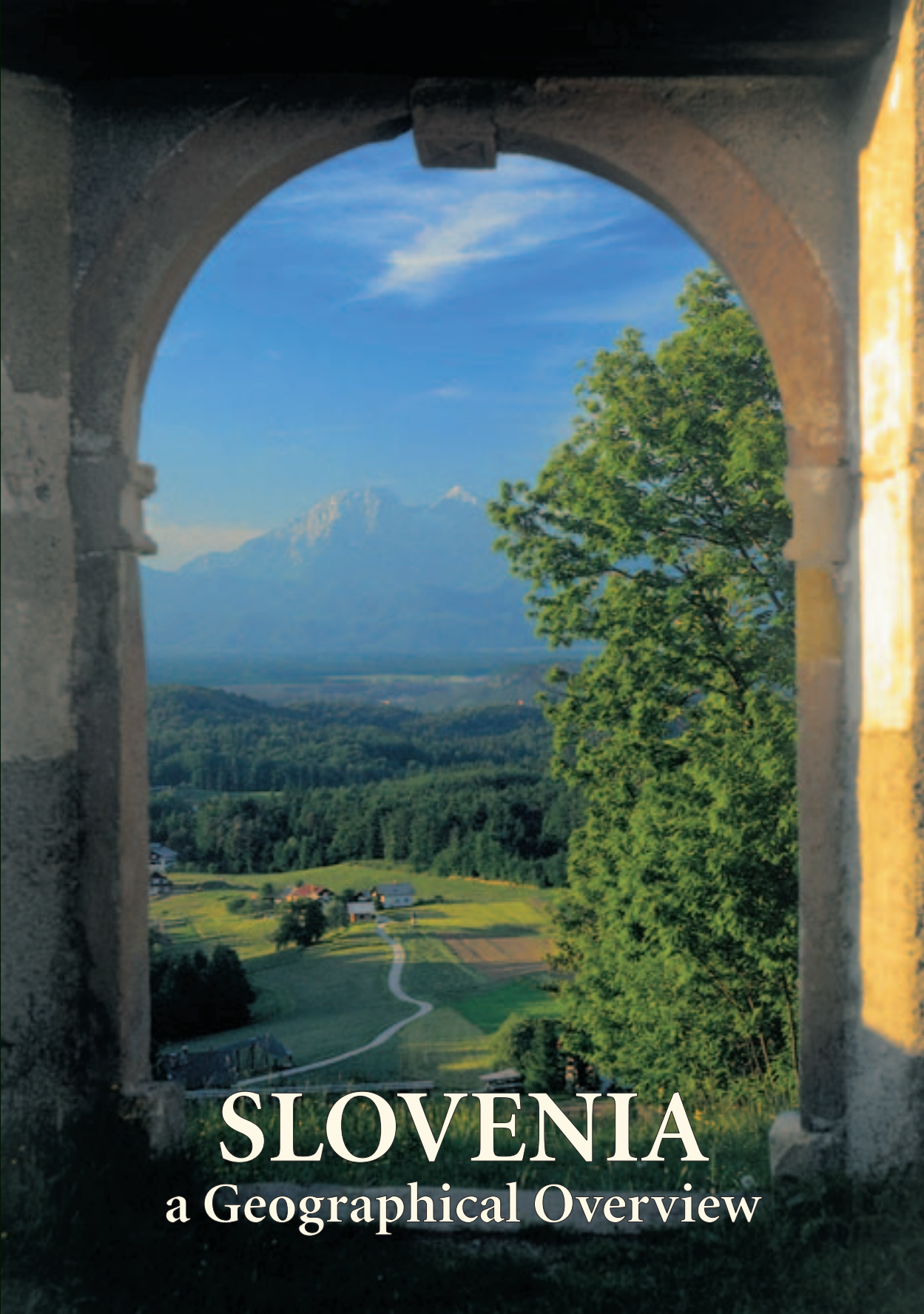

SLOVENIA
a Geographical Overview

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Ljubljana, 2004

Slovenia: a Geographical Overview

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Front cover photography: *A view through the »window« in the Alpine region (photography Miha Pavšek).*

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SLOVENIA: A GEOGRAPHICAL OVERVIEW

Milan Orožen Adamič

This publication is prepared and published on the occasion of the 30th International Geographical Congress in Glasgow, United Kingdom, on August 15–20, 2004.

Geography in Slovenia is closely linked to the transformation and development of the Slovene language into a literary language, especially after 1848 with the emergence of the clearly expressed goal of forming an independent nation and the desire for a separate nation-state. This Slovene hope was joyfully realized in 1991. The foundations of an independent Slovene geography thus reach back to the period when for centuries the territory of today's Slovenia had been part of the Habsburg Empire and later of Austria-Hungary. At Slovenska Matica (Slovene Literary Society), the most important Slovene organization before World War I, geography was always given a special place. In 1853, the first map was published that presented Slovene territory using Slovene place names exclusively (Peter Kozler, 1824–1879). Between 1869 and 1877, a series of maps of the world was published that comprised the first atlas in the Slovene language. In parallel, many regional geographical treatises and monographs about Slovene territory were also published.

An important leap for Slovene geography was the establishment of the Geographical Institute (1919) at the newly founded University of Ljubljana. In 1922, Geographical Society was founded, which later grew into the Association of Geographical Societies of Slovenia (http://www.zrc-sazu.si/agss/). In 1925, the Association began to publish the professional journal *Geografski vestnik* (*Geographical Bulletin)*, and later, in 1954, *Geografski obzornik* (*Geographic Horizon)*. The first major cartography work after 1945 was done by Ivan Selan (1902–1981) working in cooperation with Valter Bohinc (1898–1984) and France Planina (1901–1992). Roman Savnik (1902–1987) was the editor and one of the most important contributors to the four extensive volumes of *Krajevni leksikon Slovenije* (*Lexicon of Place Names of Slovenia*), the first of which was published in 1968 and the last in 1980. Anton Melik (1890–1966), however, was the primary figure in modern Slovene geography and along with a large number of treatises also wrote thirty-one books, the most important of which are *Slovenija* (1935), a general geographical monograph, and four regional monographs: *Slovenski alpski svet* (*Slovenia's Alpine World*, 1954), *Štajerska s Prekmurjem in Mežiška dolina* (*Štajerska with Prekmurje and the Mežiška Valley*, 1957), *Posavska Slovenija* (*Posavje Region of Slovenia*, 1959), and *Slovensko Primorje* (*The Slovene Littoral*, 1960). Melik won recognition as a scientist, university professor, editor, rector of the University of Ljubljana, and academician. He was among the founders of the Geographical Museum of Slovenia (1946) and the Geographical Institute and Cartography Institute of the Slovenian Academy of Sciences and Arts (1948), which today are united in the Anton Melik Geographical Institute (*http://www.zrc-sazu.si/gi/*). Svetozar Ilešič (1907–1985) and Ivan Gams (b. 1923) also contributed significantly to Slovene geography.

The first modern Slovene general geographical atlas, *Veliki atlas sveta* (*Great Atlas of the World*), was published in 1972. It was followed by *Timesov atlas sveta* (*The Times Atlas of the World*) in 1990, *Veliki družinski atlas* (*Great Family Atlas*) in 1992, and *Atlas sveta 2000* (*Atlas of the World 2000*) in 1997. The work of the newest generation of geographers is reflected in many recent books such as the revised *Krajevni leksikon Slovenije* (*Lexicon of Place Names of Slovenia*, 1995), *Slovenija – pokrajine in ljudje* (*Slovenia – Regions and People*, 1998), *Geografski atlas Slovenije* (*Geographical Atlas of Slovenia*, 1998), *Nacionalni atlas Slovenije* (*National Atlas of Slovenia*, 2001), and others. Numerous articles on specific geographical phenomena in Slovenia also appear in the biannual journal *Acta Geographica Slovenica (Geografski zbornik)*.

Established by the government of Slovenia in 1986, the Slovene Governmental Commission for the Standardization of Geographical Names (*http://www.gov.si/kszi/index.htm*) is active in Slovenia and is represented in the United Nations Group of Experts on Geographical Names.

The Slovenian National Geographical Committee, which links all the Slovene geographical institutions, plays an active role under the auspices of the Association of Geographical Societies of Slovenia. In preparing this publication, the committee decided to make it a joint project and therefore collected short articles on current geographical issues and research by members of various institutions. A list follows of the participating institutions with the names of their members who contributed to this publication. A large part of geographical research work in Slovenia is done by members of the **Anton Melik Geographical Institute of the Scientific Research Center of the Slovenian Academy of Sciences and Arts** (*http://www.zrc-sazu.si/gi/*) in Ljubljana (Gabrovec, Hrvatin, Josipovič, Kladnik, Nared, Orožen Adamič, Peršolja, Perko, Petek, Ravbar, Urbanc); the **Karst Research Institute of the Scientific Research Center of the Slovenian Academy of Sciences and Arts** (*http://www.zrc-sazu.si/izrk/*) in Postojna (Zupan Hajna); the **Department of Geography, University of Ljubljana Faculty of Arts** (*http://www.ff.uni-lj.si/geo/*) in Ljubljana (Černe, Kušar, Ogrin, Repe, Plut, Vintar Mally, Zupančič); the **Department of Geography** (*http://www.geografija.com/*), **University of Maribor Faculty of Education** (Horvat, Vovk); the **Department of Geography** (*http://www.fhs-kp.si/*), **University of Koper Faculty of Humanities** (Bufon, Gosar); and the **Agricultural Institute of Slovenia** (*http://www.kis.si/index-en.html*; Cunder).

ABOUT SLOVENIA

Milan Orožen Adamič

Slovenia is situated in Central Europe, at the confluence of four distinct regions – the Alps, the Dinaric Alps, and the Pannonian and Mediterranean basins – and four cultural regions – Slavic, Germanic, Romance, and Hungarian. It is in these unique conditions that Slovenes have nurtured, protected, and transformed their small corner of the world. Today, it is not only a place where we live and work, but also a place we carry in our hearts.

Facts

Area: 20,273 km^2.
Land border (km): with Austria 330, Italy 232, Hungary 102, Croatia 670 (total: 1,334).
Coastline: 46.6 km on the Adriatic Sea.
Highest peak: Mount Triglav (2,864 m).
Deepest sea point: –37 m (550 m from Cape Madona, Piran).
Average elevation: 556.8 m.
Average inclination: 13.1°.
The land is crossed by some 26,600 km of rivers and streams, and some 7,500 springs of drinking water rise to the surface, including several hundred first class therapeutic mineral springs.

Land use (cadastral data, 1998)

Cultivated fields: 12.4%.
Orchards: 1.9%.
Vineyards: 1.1%.
Grasslands: 28.1%.
Built-up: 3.8%.
Forests: 48.9% (Landsat-TM satellite data indicated 56.5% forests cover in 1993.)
Other: 3.8%.

Climate

In Slovenia, the climate ranges from alpine through temperate continental to mediterranean. The major part of the country has a temperate continental climate (Ljubljana: January –1.1° C, July +19.9° C, 1,394 mm precipitation). There is less precipitation and average temperatures are higher on the coast (Portorož: January +4.5° C, July +23.3° C, 1,032 mm).

Biodiversity

Slovenia's varied geological composition, diversity of relief forms, and the fact that Slovenia encompasses four distinct biogeographical regions make possible a wealth of animal and plant species. Slovenia is home to more than 3,000 fern and flower species and more than 50,000 animal species. Many animal and plant species are endemic.

Protection of nature

Natural reserves protect 5.9% of Slovenia's territory. The largest is Triglav National Park, which covers 838 km^2 (4.1%). Within the framework of »Natura 2000,« around 36% of the country is protected in regional and landscape parks.

Population

1,964,036 (2002), the vast majority are Slovenes (83.06% in 2002).
Ethnic minorities (2002): Hungarians (0.32%) and Italians (0.11%) are considered indigenous minorities with constitutionally protected rights.
Other ethnic groups (2002): Serbs (1.98%), Croats (1.81%), Bosnians (1.10%), Macedonians (0.20%), Montenegrins (0.14%), Albanians (0.31%), Romany (0.17%), and others (6.14%).

There are indigenous Slovene minorities in Italy, Austria, and Hungary. Between 250,000 and 400,000 Slovenes (depending on whether second and subsequent generations are counted) live outside the country, mostly on other continents and in European Union countries.

Population density: 97 inhabitants per km^2.
Birth rate (2002): 8.8 per thousand.
Mortality (2002): 9.4 per thousand.
Natural increase per 1,000 inhabitants: 3.1 (1985), 1.9 (1990), 0 (1995), –0.2 (2000), –0.6 (2002).
Age distribution (2002): 70.0% 15–64 years, 15.3% 0–14 years, 14.7% 65 and over.
Life expectancy (2002): 72 years (men), 79 years (women)
Urban population (2002): 50.1%.
Religion (2002): The majority of Slovenes are Roman Catholics (57.8%), although there are some small communities of other denominations: Protestants (0.8%), Orthodox (2.3%), Muslims (2.4%), and others.
Official language: Slovene, which in addition to singular and plural employs the almost unique dual conjugation form for two people. In ethnically mixed regions, also Italian and Hungarian.

Some Important Milestones

The ancestors of present-day Slovenes first settled in the area in the 6th century.
7th century: The Duchy of Carantania was the first Slovene state.
745: Carantania became a part of the Frankish empire; the Slavs converted to Christianity and gradually lost their independence.
10th century: The Freising manuscripts, the first known writings in the Slovene and Slavic dialect in Latin script.
14th century to 1918: All the Slovene regions passed into the possession of the Habsburgs, later the Austro-Hungarian Monarchy. The Reformation brought literacy and the first printed book in 1550, and in 1584 the first Slovene translation of the Bible was printed.
1809–1813: The establishment of the Illyrian Provinces – half of Slovenia was included in Napoleon's French empire – strengthens Slovene national consciousness.
1848: The United Slovenia movement demands the unification of all Slovenes in a single province within the Austrian Empire.
1918: At the end of World War I, after the unsuccessful attempt at Trialism (the division of the Habsburg Monarchy into Austrian, Hungarian, and Yugoslav parts) and the collapse of Austria-Hungary, Slovene ethnic territory is divided among four countries; within the Kingdom of Serbs, Croats, and Slovenes

(Kingdom of Yugoslavia), Slovene territory is initially divided into two administrative units (under Ljubljana and Maribor authorities) and then incorporated in the Drava ban's domain.
1919: Prekmurje is included in the Kingdom of Serbs, Croats, and Slovenes.
November 29, 1945: The Slovenes secure their own republic within the Federal People's Republic of Yugoslavia.
September 15, 1947: The greater part of Primorska is rejoined to Slovenia on the basis of the Treaty of Paris.
April 1990: First democratic elections.
December 23, 1990: 88.5% of voters cast their votes for an independent Slovenia in a referendum.
June 26, 1991: Proclamation of Slovenia's independence.
December 23, 1991: The new Slovene constitution is adopted.
January 15, 1992: Slovenia is recognized by all the members of the European Union.
May 22, 1992: Slovenia becomes a member of the United Nations.
March 29, 2004: Slovenia becomes a member of NATO
May 1, 2004: Slovenia becomes a member of the European Union.

Government and Political System

Constitutional type: parliamentary democracy.
Conventional long/short name: Republic of Slovenia, Slovenia.
Local long/short form: Republika Slovenija, Slovenija.
Legislative authority: National Assembly *(90 deputies)*.

Capital: Ljubljana (260,543 in 2002).
Other main cities: Maribor, Celje, Kranj, Velenje, Koper, Novo mesto, Ptuj, Jesenice, Trbovlje, Nova Gorica, Murska Sobota.
Municipalities: 193 (11 have the status of City Municipality: Celje, Koper, Kranj, Ljubljana, Maribor, Murska Sobota, Nova Gorica, Novo mesto, Ptuj, Slovenj Gradec, Velenje).

Economy

Currency: Tolar (SIT), made up of 100 stotins (192.26 SIT = 1 EUR, July 2004).
GDP per capita: 8,699 USD (1990), 9,527 USD (2000), 11,775 USD (2002).
Real growth of GDP: 3.4% (2002).
Standardized rate of unemployment (ILO): 7.7% (1998), 7.2% (2000), 6.4% (2003).
Inflation rate: 9.1% (1997), 7.9% (1998), 6.1% (1999), 3.8% (2003).
International Trade Exports of goods and services: 6.7% (1998), 1.7% (1999), 8.2% (2003).
Imports of goods and services: 10.4% (1998), 8.2% (1999), 8.4% (2003).

Main foreign trading partners: Germany, Italy, Croatia, Austria, France, Bosnia-Herzegovina, United States of America, Russia, United Kingdom, Hungary, and The Netherlands.

Source of data: Statistical Office of the Republic of Slovenia,
http://www.stat.si/eng/index.asp

SLOVENIA AT THE JUNCTION OF MAJOR EUROPEAN GEOGRAPHICAL UNITS

Drago Perko

Very few countries, even considerably larger ones, can boast the landscape diversity found in Slovenia since the Alps, the Pannonian Basin, the Dinaric Alps, and the Mediterranean meet and interweave in this small corner of Central Europe (Melik 1954, 1957, 1959 and 1960; Melik 1963; Ilešič 1979; Gams 1986; Orožen Adamič and Perko, Kladnik 1995; Perko 1995; Gosar 1996; Fridl, Marin, Orožen Adamič, Pavšek, Perko, Šimenc and Vertačnik 1996; Ogrin 1997; Perko 1997; Fridl, Kladnik, Orožen Adamič and Perko 1998; Gams and Vrišer 1998; Natek and Natek 1998; Perko 1998; Gams 2001; Perko and Adamič 2001; Perko 2001b). So in spite of its small size, Slovenia is famous for its great natural diversity, variability, and transitional characteristics. Many geographers have observed that Slovenia is a natural geographical laboratory.

The **Alps** are the largest and highest mountain chain in Europe. Along them runs the divide between the North Sea and the Mediterranean Sea and the dividing line between the Continental and Mediterranean climates. Covering about 200,000 km^2, the Alps are more than 1,200 kilometers long and in some place up to 250 kilometers wide. They run from France in the southwest to Austria in the northeast. The southeastern part of the Alps extends into Slovenia.

The **Pannonian Basin** lies between the Alps to the west, the Carpathians to the north and east, and the Dinaric Alps to the south. Running about 600 kilometers from north to south and 700 kilometers from west to east, it covers almost twice the area as the Alps. The western margin of the Pannonian Basin extends into Slovenia.

The **Dinaric Alps** are the southeastern continuation of the Alps between the Pannonian Basin and the Adriatic Sea. And form the divide between the Black Sea and the Adriatic. They are 700 kilometers long and almost 200 kilometers wide at the center. They cover less than half the area of the Alps. The northwestern part of the Dinaric Alps extends into Slovenia.

The **Mediterranean** is the area around the Mediterranean Sea. It runs almost 7,000 kilometers from Gibraltar to the Bosporus Strait, and between Trieste and Durrës on the Adriatic Sea where it runs along the Italian Apennines to the southwest and the Dinaric Alps to the northeast it is almost 700 kilometers long. Covering an area of 132,000 km^2, the Adriatic Sea is somewhat larger than the Dinaric Alps. The northern margin of the Mediterranean extends into Slovenia.

In Slovenia, geography plays the leading role in landscape research. A pioneering role was played by the geographer Anton Melik, a member of the Slovenian Academy of Sciences and Arts, who published the first regional monograph of Slovenia in four extensive volumes between 1954 and 1960 (Melik 1954, 1957, 1959 and 1960) as well as the first general monograph of Slovenia (Melik 1963).

At Melik's initiative, the Slovenian Academy of Sciences and Arts founded the Geographical Institute in 1946 (formally in 1948), and this institute has carried his name since 1976. Almost half a century later, the Anton Melik Geographical Institute, which now works in the framework of the Scientific Research Centre of the Slovenian Academy of Sciences and Arts, prepared the second regional monograph of Slovenia entitled Slovenia: Landscapes and People (Perko, Orožen Adamič 1998) and the Geographical Atlas of Slovenia (Fridl, Kladnik, Orožen Adamič and Perko 1998). Three years later, the Institute also prepared the first national atlas of the country, the National Atlas of Slovenia (Fridl, Kladnik, Orožen Adamič, Perko and Zupančič 2001), which was published in Slovene and English versions. All three books contain chapters on regionalization and the typification of landscapes in Slovenia with numerous maps. The Institute has also published numerous other publications about Slovene landscapes.

Table 1: Some basic characteristics of landscape types in Slovenia.

Landscape types	Surface area (ha)	Proportion of surface area (%)	Mean elevation (m)	Mean inclination (°)	Most frequently occurring rock	Most frequent vegetation	Solar energy received (MJ/m^2)
Alpine mountains	306,148	15.1	1,054.5	24.5	limestone 51.5%; carbonate gravel and conglomerate 17.4%	beech 36.9%; high-mountain vegetation 18.7%	3705
Alpine hills	466,008	23.0	582.4	16.9	older volcanic rocks with tuff 20.9%; metamorphic rock 16.9%	beech 31.7%; beech, chestnut, and oak 30.6%	3953
Alpine plains	81,928	4.0	373.3	4.0	carbonate gravel and conglomerate 74.2%; clay and silt 9.3%	red pine 39.3%; beech 25.4%	4080
Alpine landscapes together	854,084	42.1	731.6	18.4	limestone 23.9%; carbonate gravel and conglomerate 17.4%	beech 33.4%; beech, chestnut, and oak 18.9%	3877
Pannonian low hills	299,428	14.8	288.7	8.8	marl 29.7%; clay and silt 27.8%	beech, chestnut, and oak 86.5%; beech 4.6%	4131
Pannonian plains	129,663	6.4	196.0	0.8	silicate gravel 58.4%; clay and silt 31.5%	English oak 27.3%; hornbeam and English oak 25.1%	4178
Pannonian landscapes together	429,091	21.2	260.7	6.4	clay and silt 28.9%; silicate gravel 21.3%	beech, chestnut, and oak 77.1%; red pine 4.7%	4146

Landscape types	Surface area (ha)	Proportion of surface area (%)	Mean elevation (m)	Mean inclination (°)	Most frequently occurring rock	Most frequent vegetation	Solar energy received (MJ/m^2)
Dinaric plateaus	380,918	18.8	667.7	13.7	limestone 58.9%; dolomite 29.4%	beech and fir 40.4%; beech 23.5%	3947
Dinaric valleys and corrosion plains	189,715	9.4	403.3	6.6	limestone 46.3%; clay and silt 23.2%	hornbeam and fir 32.4%; beech 16.5%	4122
Dinaric landscapes together	570,633	28.2	579.8	11.4	limestone 54.8%; dolomite 26.6%	beech and fir 34.9%; beech 21.9%	4005
Mediterranean low hills	106,090	5.2	305.8	11.1	flysch 72.6%; clay and silt 11.9%	sessile oak 31.9%; downy oak 30.7%	4373
Mediterranean plateaus	67,300	3.3	426.0	7.7	limestone 82.1%; flysch 10.9%	beech and hop hornbeam 74.7%; downy oak and hop hornbeam 19.8%	4381
Mediterranean landscapes together	173,390	8.5	352.4	9.8	flysch 48.6%; limestone 38.7%	beech and hop hornbeam 32.7%; sessile oak 22.0%	4376
Slovenia	2,027,198	100.0	556.8	13.1	limestone 29.5%; dolomite 14.6%	beech 23.9%; beech, chestnut, and oak 23.9%	4012

Also active in the field of landscape studies has been academician Ivan Gams, author of the university textbook Essentials of Landscape Ecology (Gams 1986) and several textbooks on the Slovene landscapes with maps of the regionalization of Slovenia (Gams and Vrišer 1998; Gams 2001).

Based on the predominant natural features, Slovenia is divided into the Alpine, Pannonian, Dinaric, and Mediterranean landscapes (Perko 1997; Perko 1998; Fridl, Kladnik, Orožen Adamič, Perko and Zupančič 2001; Perko 2001a; Urbanc 2002).

Alpine landscapes

The **Alpine landscapes** lie in northern Slovenia, cover two fifths of its territory, and are subdivided into mountain, hill, and plain landscapes.

The **Alpine mountains** in northwestern Slovenia are largely composed of carbonate rock, primarily limestone and dolomite. Rivers carved deep valleys that glaciers reshaped during the Ice Ages. Above the forest line, which runs at an altitude of around 1,600 m, a fifth of the surface is covered by dwarf pine, while below it, four fifths is covered by thick forest. Beech, beech-fir, and spruce forests dominate. The density of settlement is three times smaller than the Slovene average. Only the wider valleys are more densely populated, while extensive high mountain areas are completely uninhabited. The population here is increasing only slightly.

The most imposing mountains are the Julian Alps around Mount Triglav (2,864 m), Slovenia's highest mountain. Below it is the Triglav glacier, the southeasternmost glacier in the European Alps. Triglav

Figure 1: Alpine landscapes: in the background, the Julian Alps, the Karavanke mountains with Mount Stol (2,236 m), and the Kamnik-Savinja Alps converge; in the foreground is the Sava Plain (Savska ravan) with forest-covered conglomerate and cleared gravel river terraces near the small town of Radovljica in the northwestern part of the Ljubljana Basin (photography Marjan Garbajs).

National Park was established to preserve the many natural beauties of this area. On the south side, the blue-green Soča River winds through its deep valley toward the Adriatic Sea. Its upper section, the Trenta Valley, is one of Slovenia's most beautiful alpine valleys. Farther south lies Tolmin (population 3737 according to the 2002 census), the only larger town in the central part of the Soča Valley. Picturesque glacial valleys open to the north: Krma, Kot, Vrata, and Planica. The latter is called the »Valley of Ski Jumps« and is the cradle of ski flying, one of Slovenia's most popular winter spectator sports. From the north side of the Julian Alps, the rivers flow to the Black Sea. The Sava Dolinka, which runs past Jesenice (13,429) and its ironworks, and the Sava Bohinjka, which flows from glacial Lake Bohinj, Slovenia's largest natural lake (328 ha), past the cosmopolitan tourist resort of Bled (5,252) and Lake Bled (145 ha), which boasts a small picturesque island with a church, join to form the Sava River. Toward the east, the Karavanke mountains (highest peak Mount Stol, 2,236 m) stretch along the Austrian border, and south of these, the Kamnik-Savinja Alps (Mount Grintovec, 2,558 m). Below Mount Skuta (2,533 m) are remnants of a glacier, and the romantic Logarska dolina valley at the head of the Savinja River is especially attractive.

To the south and east, the broad band of the **Alpine hills** borders the Alpine mountains. These are composed primarily of dolomite, limestone, metamorphic rocks, claystone, siltstone, and flint sandstone and conglomerate. Two thirds of the surface is covered by forest. There is a pronounced prevalence of various beech forests. The density of settlement is twice as much as in the mountains. Isolated farms appear in this region, each typically consisting of a large house and outbuildings surrounded by an unbroken cultivated parcel of land cleared from the forest. In other places, small nucleate villages formed whose buildings stand separately in a random order but as a recognizable compact group, as do the agricultural plots. Increasing numbers of farmhouses are being converted into vacation houses owned by townspeople, some farms are engaged in farm tourism, and remote villages are in decline. The main sources of income are livestock production, forestry, and employment in smaller industrial centers in the valleys. In the western part, which is well known for its lacemaking, are the towns of Idrija (5,878) with its famous but now abandoned mercury mine, and medieval Škofja Loka (12,289). In the mining-oriented eastern part can be found the ironworks of Ravne na Koroškem (7,797), Velenje (26,742) with its lignite mine, and Trbovlje (16,290), the largest of the mining towns in Slovenia's biggest hill region, the almost 100-km-long Posavsko hribovje with its largely exhausted coal deposits.

The **Alpine plains** were formed by rivers that deposited gravel and sand on the bottoms of basins and formed terraces. Older terraces where gravel cemented to form conglomerate have been karstified and overgrown with forest, primarily red pine, while fertile fields cover the younger gravel terraces where mainly potatoes and corn are cultivated. Cultivated fields cover a quarter of all the surface area. Settlements on the plains are large and greatly urbanized. The density of settlement is six times larger than the national average. In the northern part of the Ljubljana Basin, Slovenia's largest basin, the Sava River and its tributaries filled the Sava Plain, where more than a fifth of all Slovenia's population lives on only one thirtieth of its territory. Here are the Slovenia's capital Ljubljana (258,873), the industrial city of Kranj, the fourth largest city in Slovenia (35,587), and several smaller but economically significant towns: Radovljica (5,937), Tržič (3,920), Kamnik (12,197), and Domžale (11,582). The Celje Basin is Slovenia's second largest basin. On its floor, the Savinja River and its tributaries created the Savinja Plain. Here are found Celje (37,834), Slovenia's third largest city, once the seat of the historically important Counts of Celje, and Žalec (4,919), surrounded by vast hop plantations that reflect Pannonian climate influences from the east.

Pannonian landscapes

The **Pannonian landscapes** lie in eastern Slovenia and cover a fifth of its territory. They are composed of densely settled and intensively cultivated areas where forest no longer covers even a third of the surface. They are divided into low hill and plain landscapes.

The winegrowing **Pannonian low hills**, which meet the Alpine mountains in the west, are composed of weakly agglutinated rocks, primarily marl, sand, and clay, and are therefore vulnerable to landslides. Dispersed settlements that are not compact are prevalent, with cultivated land between the houses. Homes are most frequently located on the tops of rounded ridges. Below them on the sunny slopes are vineyards, which produce high quality wine, and orchards, while on the shady slopes there is primarily forest, mostly beech, chestnut and oak, which covers a good third of all the surface. Farmers are engaged primarily in winegrowing and fruit growing. In the middle of the vineyards, traditional wooden wind-rattles turn in the wind, driving birds away. Many of the ridge houses have been converted into vacation houses, and the population is decreasing slightly. The largest Pannonian low hill regions are Slovenske gorice and Goričko, Slovenia's most northerly region.

The vast **Pannonian plains** lie between the low hills along the slow and meandering Mura, Drava, and Krka rivers on which numerous mills once operated. Vulnerable to flooding, these plains are of major agricultural importance. Maribor (93,847), Slovenia's second largest city, and Ptuj (18,339), its oldest inland city, are located on the Drava Plain; Murska Sobota (12,437) on the Mura Plain; and Krško (6,994) with its nuclear power plant near, the medieval town of Kostanjevica na Krki (701), and the Krakovski gozd nature reserve – the remains of a once vast lowland swamp forest – are on the Krško Plain. Today, forest covers less than a fifth of the surface of the plains, the lowest proportion in Slovenia; only the more frequently flooded areas are still covered with forests of English oak. In order to exploit the arable land more efficiently, people built their homes and outbuildings only along the main traffic routes. Large long villages arose with buildings evenly distributed in a row on one side or both sides of the road. The large stork nests frequently seen on the chimneys of these single-story houses add a pic-

Figure 2: Pannonian landscapes: in the foreground, the cultivated Drava Plain (Dravska ravan); in the background, first the vineyard-covered Dravinja Low Hills (Dravinjske gorice), behind them the steeper Haloze region known for its frequent landslides, and above it the table-shaped Mount Donačka gora (882 m), (photography Marjan Garbajs).

turesque touch. Vast farming plots extend behind the houses, usually divided into unbroken strips. The farmers are primarily involved in crop farming and raising livestock. Thermal and mineral water rising to the surface at tectonic faults in this region formed the basis for the development of health resort tourism (Rogaška Slatina, Radenci, Čatež, and Šmarješke Toplice).

Dinaric landscapes

In the south, the Alpine and Pannonian landscapes are replaced by the **Dinaric landscapes**, which run from northwest to southeast and occupy the greatest part of southern Slovenia. Dinaric landscapes, primarily the karst valley systems and the interim karst plateaus, constitute a good quarter of Slovenia.

The **Dinaric plateaus** are composed almost entirely of limestone and dolomite and are the most forested regions of Slovenia; forest covers almost three quarters of their surface. Beech and beech-fir forests dominate. Surface waters are rare, and droughts and forest fires occur frequently. The traditional economic branches are forestry and the related wood industries. Small nucleate villages with irregularly distributed buildings are dominant. Because of unfavourable natural conditions, the farms survive on forestry and livestock production. The population density is six times smaller than the Slovene average, and the population is decreasing, even though the majority of households are equipped with modern telecommunication and household equipment.

Dinaric valley systems and corrosion plains where forest still covers two fifths of the surface run between the Dinaric plateaus. The corrosion plains are largely composed of limestone and dolomite,

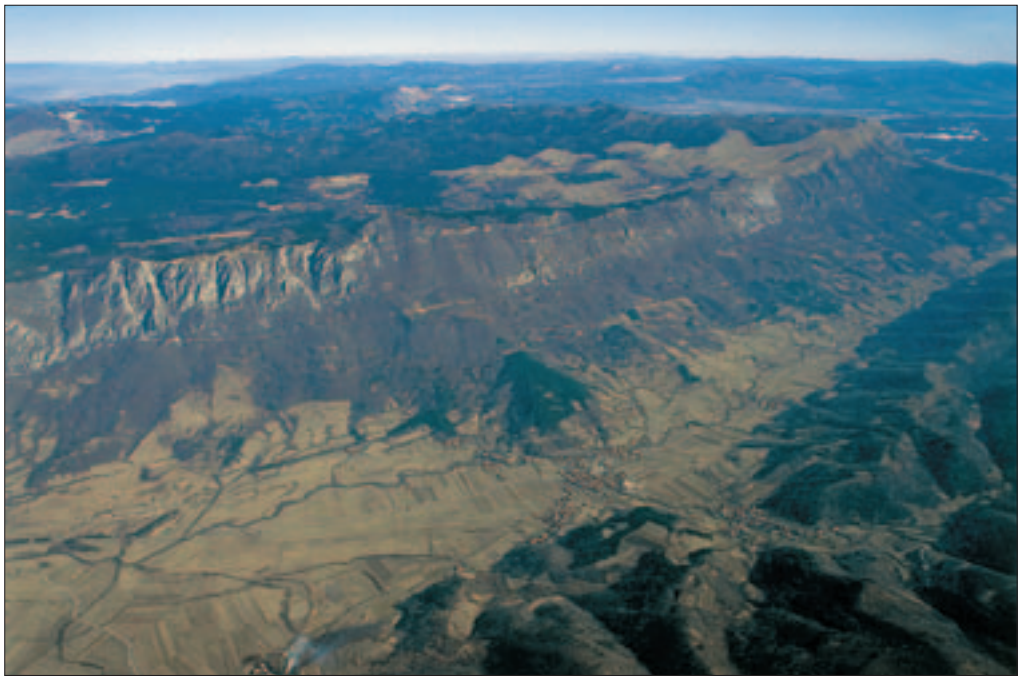

Figure 3: Dinaric landscapes: in the foreground, the Dinaric karst plateau of Nanos (1,262 m) rises steeply above the Mediterranean flysch Vipava Valley (Vipavska dolina) and the Vipava Low Hills (Vipavska brda); in the background, beyond the Pivka valley system (Pivško podolje) and Postojna, Dinaric plateaus and valley systems alternate (photography Marjan Garbajs).

while in the valley systems is some clay and flysch as well. Farthest east lies Bela krajina, a low corrosion plain with strong Pannonian influences, and the undulating landscape around Novo mesto (22,415), the capital of Dolenjska. Toward the west are valley systems (»*podolje*«) important for traffic with karst poljes that provide the greatest proportion of arable land but also the threat of flooding: Dolenjsko podolje, Ribniško-Kočevsko podolje with Kočevje (9,027), Notranjsko podolje with the famous intermittent Cerknica Lake (three hundred years ago, the Slovene polymath Janez Vajkard Valvasor was made a member of the Royal Society in London as a result of his research describing this unusual phenomenon), and Pivško podolje with Postojna (8,548).

In contrast to the unfriendly surface is the fairy-tale underground world carved out by water. More than seven thousand caves rich with stalactites, stalagmites, and other karst cave formations have been discovered so far below the Dinaric and neighbouring Mediterranean karst regions. Among them are the Škocjan Caves, which have been on the UNESCO list of worldwide cultural and natural heritage sites since 1986 and are famous for the world's largest underground canyon, 2.5-km-long and 130 m high, and the world famous Postojna Cave, which has been visited by several million people. The karst underground is also famous for its fauna, which has adapted to life without light. The best known species is the cave salamander *Proteus anguinus*, which is endemic to the Dinaric karst region and the symbol of Slovenia's natural science.

Mediterranean landscapes

To the southwest, the Dinaric landscapes join the **Mediterranean landscapes**, which occupy something less than a tenth of Slovenia. It is divided into the more densely populated flysch low hills with their vineyards and orchards and the less densely populated lower karst plateaus. Here are found typical Mediterranean settlements with each building attached to the next. The houses are built of stone and have one or two floors. Every village has at least one square with a common stone well, which due to the modern water supply infrastructure today has only architectural value. The settlements located on elevations are the most outstanding. One example is Štanjel, where houses built from local stone run along the contour lines of the sunny side of a hill. This compact village is surrounded by a wall and retains the appearance of a small medieval town. Today it is protected as a first-class architectural monument of the Slovene cultural heritage.

The **Mediterranean plateaus** are composed almost completely of limestone and are therefore pronouncedly karstified. A typical example is the Kras region, which gave name to the science of karstology since it was here on Slovene territory that the study of karst phenomena created by the dissolving of permeable limestone began. Many other Slovene terms have also been incorporated in the international terminology for karst phenomena. The tourist sightseeing of caves began here as well. The oldest tourist cave in the world is Vilenica near Divača, where entrance fees were collected as early as the first half of the 17th century. The grey-white colour of the karst stone complements the white colour of the Lipizzaner horses from the Lipica stud and the intensely red terra rossa soil. The Mediterranean plateaus have the highest amount of sunshine in all Slovenia, receiving on average almost 4,400 MJ per m^2 yearly.

The **Mediterranean low hills** receive almost as much solar energy. In the extreme southwest they reach Slovenia's 47-km-long Adriatic coast and its great concentration of population and variety of activities. Here are three towns with typical ancient Mediterranean town centers: Koper (23,726), Slovenia's largest port, which ships around ten millions tons of goods annually, the fishing town of Izola (10,381), and the tourist town of Piran (4,143). The Adriatic cuts most deeply in land at the Bay of Piran. On its northern side is Portorož, the largest Slovene tourist center, and there were once vast salt works not far away at the delta of the Dragonja River on the border with Croatia. At present, salt is only extracted from a small portion of the salt pans, while due to their halophyte vegetation and numerous bird

Figure 4: Mediterranean landscapes: in the foreground in the Koper Low Hills (Koprska brda) lies the picturesque Istrian ridge village of Padna (205 m) with its greatly overgrown cultivated terraces; in the background, first the village of Korte and then the Bay of Piran on the Adriatic Sea (photography Marjan Garbajs).

species the abandoned areas are extraordinarily interesting from the point of view of the natural sciences. Also interesting is the nearby precipice at Strunjan, the tallest flysch cliff on the Adriatic coast.

The immediate coastal area of the Koper Low Hills with its vineyards and orchards – in some places the cultivated terraces are unfortunately greatly overgrown – rises rapidly to the high and imposing limestone wall of the karst rim, behind which the extensive karst corrosion plains of Čičarija and Kras begin. The Kras plateau descends in the north to the Vipavska brda region and the fertile Vipava Valley, which is notorious for its violent bora winds. To the west, the Kras plateau extends to the Soča River and the border city of Nova Gorica (13,491) and in the northwest rises again to the flysch winegrowing and fruit growing Goriška brda region, which in turn approaches the Alpine mountains in the north where we began our journey through Slovenia's regions (table 1).

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SLOVENIA AS A EUROPEAN CONTACT AREA

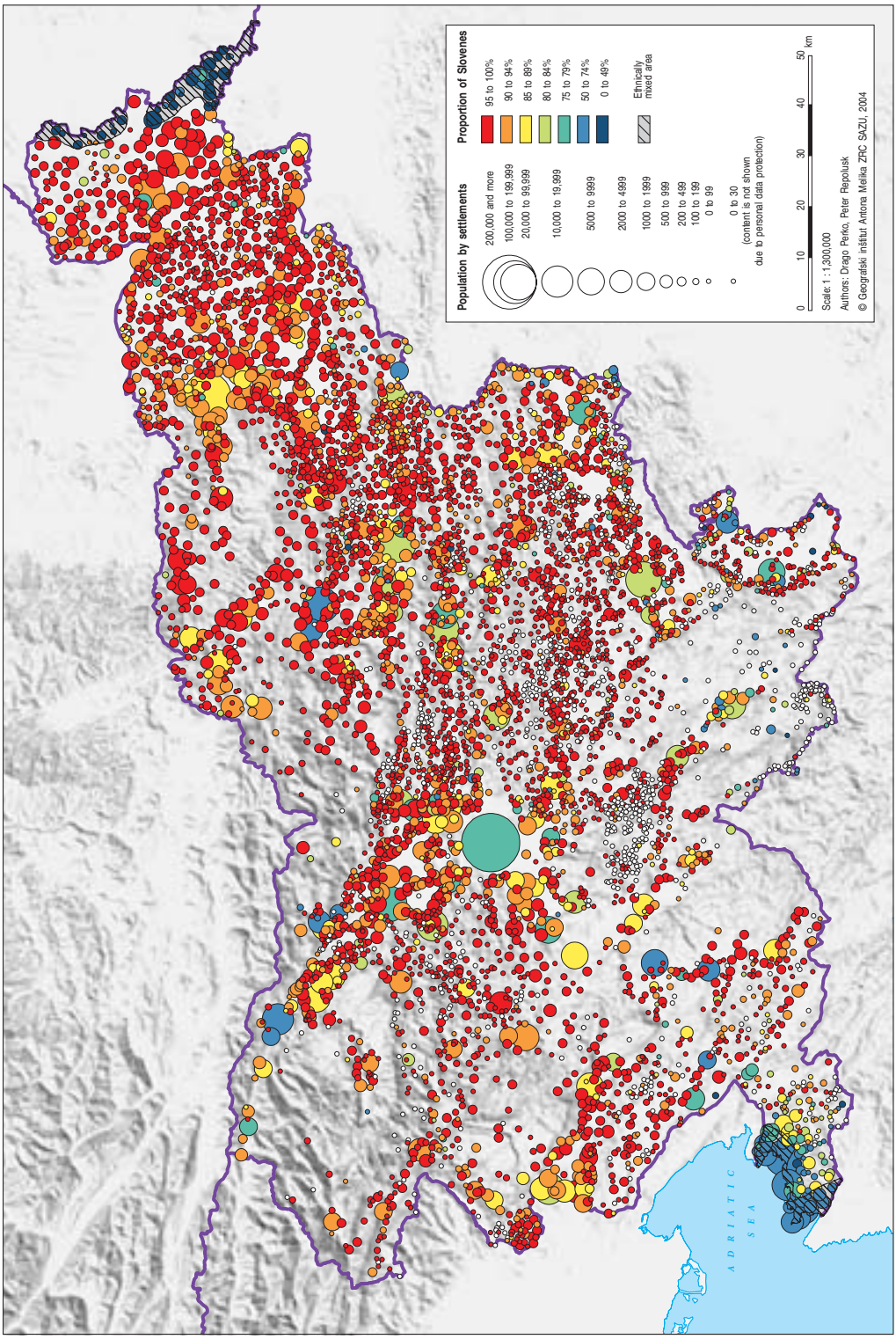
Milan Bufon

Slovenia: Area of Contact or Periphery?

In a wider sense, we could say that in the framework of the natural sphere, four European landscape macroregions meet on the Slovene territory, and at the same time, in the framework of cultural sphere, Slovenia is also the meeting place of four major European language groups: Slavic, Germanic, Romance, and Finno-Ugric. In this view, Slovenia, together with Austria, is the only European country at the contact point of all the listed language groups; however, these groups only actually coexist inside the national territory of Slovenia. This was even more true of past periods when Slovene territory was included in the multi-ethnic Austrian state, which enabled the dynamic flow of various ethnic and language groups within the national territory, particularly in the direction of larger urban centers. In spite of this, the Austrian census for 1910 established that the Slovene population on today's territory of Slovenia comprised over 80% of all the inhabitants of the territory with the remaining proportion more or less equally divided between Germans and other nationalities, among whom Italians and Hungarians were the most numerous. Because these »strong« neighbouring ethnic and language communities, especially the Germans but also Italians and Hungarians, were dominant on the local and even more so on a wider regional level, their influence was evident in the gradual assimilation of nearby Slovene populations to these communities, which was particularly obvious at the »edges« of Slovene ethnic territory or in areas where today a Slovene population is present as a minority outside the borders of Slovenia (according to Slovenia's estimates, more than 80,000 Slovenes live in Italy, more than 40,000 in Austria, and about 5,000 in Hungary – Zupančič 1998).

This procedure of »normalization« or standardization of the structure of the population in the framework of state systems and the subsequent assimilation of minority social groups into the majority pattern, was here, as elsewhere in Europe, most pronounced in the first half of the twentieth century when intensive political-geographical changes and consequential changes to national borders occurred. Here, I would like to point out only that to a certain degree, a similar »normalization« also occurred after World War I and World War II, especially in the territory of the Upper Adriatic (Bufon 1997 and 2002b) but also in the remaining territory of Slovenia (Gosar 1993), when the number of members of the German, Italian, and Hungarian communities fell drastically, first due to emigration of public servants and later of other categories of the population who were in one way or another connected with the aggressor countries. Regardless of the various »backgrounds« and causes of the changing of the ethnic structure in Slovenia after World War I, it also contains the influence of a certain social and geopolitical »reorientation« of Slovene territory toward the south, since it became a part of the Kingdom of Yugoslavia and later of the Federative Socialist Yugoslavia.

This »reorientation« did not have immediate consequences from the viewpoint of the ethnic structure of Slovenia, since in 1971 it showed an almost »pure« national image (about 95% of the population was of Slovene nationality). After 1971, the proportion of the Slovene population in Slovenia decreased to about 90% in 1981 and less than 88% in 1991 due to the intensive immigration flow of the labour force from other Yugoslav republics. This is why the numbers of immigrant non-autochthonous groups, which since the independence of Slovenia have only partly assimilated into the Slovene population, today by far exceed the numbers of autochthonous minorities (the latter today total less than 1% of the entire population of Slovenia) and are mostly concentrated in industrial centers where they comprise mostly between 15% and 30% of the urban population, in Jesenice even more than 35%.


Population by settlements
200,000 and more
100,000 to 199,999
20,000 to 99,999
10,000 to 19,999
5000 to 9999
2000 to 4999
1000 to 1999
500 to 999
200 to 499
100 to 199
0 to 99
0 to 30
(content is not shown
due to personal data protection)
Proportion of Slovenes
95 to 100%
90 to 94%
85 to 89%
80 to 84%
75 to 79%
50 to 74%
0 to 49%
Ethnically
mixed area
0
10
20
30
40
50 km
Scale: 1 : 1,300,000
Authors: Drago Perko, Peter Repolusk
© Geografski inštitut Antona Melika ZRC SAZU, 2004
ADRIATIC
SEA

◄ *Figure 1: Ethnic structure in 1991.*

In general, the positive migration balance is the only source of demographic increase for the country, which in the last few years has no longer recorded a natural increase in population. In short, as with many other countries of Western and Central Europe, economic migration has played an important role in the process of the industrialization of Slovenia, which in this way gained recognition as a kind of »Yugoslav Switzerland.«

After 1991, a renewed political and social reorientation toward the north and west appeared, because of which the level of communication with Vienna and Brussels today is as it was with Zagreb and Belgrade before independence. The transportation role of Slovene territory has also changed: if the northwest-southeast direction dominated the Slovene traffic »cross« in the past, today, because of the Yugoslav conflict, the southwest-northeast direction dominates strongly. Although Slovenia has an important strategic and traffic position from the international viewpoint (Klemenčič and Genorio 1993), it still remains somewhat on the »edge« of developmental currents because Ljubljana is 300 to 500 kilometers away from the closest European metropolises. The position of geocultural and geopolitical contact and simultaneous peripheralness brings a number of discrepancies. The great majority of Slovenia's economic exchange occurs with countries of the European Union and Slovenia itself soon ranked among the main candidates for the next expansion of the Union, but a recent survey indicated that only a few citizens of the member countries of the European Union know Slovenia well enough to support its entering the Union. But also, many Slovene economists still think it would be better for Slovenia to preserve its status of »developed among the developing« relative to the space of former Yugoslavia rather than to head for the insecurity brought by the status of »developing among the developed« in the framework of the European Union (Bufon 2003).

Slovenia as a Border Area

The border status of Slovenia can easily be understood from the ratio between the amount of national territory (20,256 km^2) and total length of its political borders (1,160 km), on the basis of which we can calculate that in Slovenia, every 100 km^2 has on average 5.7 kilometers of international border. In Europe, only Luxemburg has a higher level of border character (almost 9 kilometers of border per 100 km^2 of territory). If we take a 25 kilometer wide border zone to define the criteria of establishing the border area and multiply that zone by the length of political borders, we establish according to this criteria that Slovene border areas essentially cover the entire national territory, this ranks Slovenia, together with Switzerland and Belgium, in the category of small border countries where border areas comprise 75% to 100% of the national territory (Bufon 1996). Somewhat more concretely, we can further define the degree of Slovenia's border character by calculating the proportion of Slovene border municipalities that lie not more than 25 kilometers from a national border of all the municipalities in Slovenia. According to this method, some 61% of Slovenia's municipalities can be defined as border municipalities, and if the border zone is limited to only a 10-kilometer distance from the border line, their proportion still totals 50%. The border character of Slovenia is further underlined by the fact that Slovenia's capital Ljubljana is on average only 60 kilometers from the Austrian border, 90 kilometers from the Italian border, and 110 kilometers from the Croatian border, while the Hungarian border, about 220 kilometers away, lies the farthest away.

In congruence with the border character of Slovenia, its cross-border traffic increased from about 140 million passengers in 1992 to 180 million in 2002 (considering only road border crossings). This means that almost half a million people on average travel across Slovene border crossings every day. Of the total cross-border traffic, Slovene citizens make almost 30% or just above 50 million annual cross-

ings, meaning that about 140,000 Slovene citizens or 7% of the entire population of Slovenia cross the Slovene borders daily. This data also gives us a clear picture of the level of the border character of Slovenia, since in accordance with the above data it is possible to calculate that on average every Slovene citizen (including children and older people) visits a foreign country once every fourteen days. Among foreign citizens, according to the data from the Statistical Office of Slovenia, Croatians (about 40 million or 22% of all crossings), Italians (about 38 million or 21% of all crossings), Austrians (about 23 million or 13% of all crossings), and Germans (about 13 million crossings) dominate, followed by Czechs (3 million), Hungarians (2.5 million), Swiss (2 million), and Slovaks and Dutch (about 1 million) while residents of other former Yugoslav republics together total over 2.5 million crossings of Slovenia's borders. This distribution indicates that the structure of cross-border crossings in the territory of Slovenia is a combination of prevailing local, inter-state, and transitional traffic, which is more pronounced in the summer period although Slovenia is the tourist destination of less than a million tourists. The distribution of crossings over Slovene borders according to border sectors is illustrated in Table 1, where the change in the structure of border crossings from 1992 to 2001 is also evident.

Table 1. Changes in the structure of border crossings by border sectors in Slovenia between 1992 and 2001.

	1992		1995		2001	
	passengers in millions	proportion (%)	passengers in millions	proportion (%)	passengers in millions	proportion (%)
SLO/I	51.4	36.0	74.5	41.3	64.9	36.3
SLO/A[1]	39.4	27.6	50.7	28.1	48.6	27.1
SLO/H[1]	1.9	1.3	4.8	2.7	4.1	2.3
SLO/CRO	50.2	35.1	50.3	27.9	61.3	34.3
Total	142.9	100.0	180.3	100.0	178.9	100.0

Source[1]: Statistical Office of Slovenia.

In general, in trends of border traffic by border sectors, we observe an intensive increase of crossings over the Slovene-Italian border until 1995 and then a decrease or stabilization to about 65 million crossings, which is undoubtedly the result of introducing special gasoline cards for the residents of

Table 2. Some basic characteristics of Slovene border sections.

	1	2	3	4	5
SLO/I	17.4	35.0	38.5	17.3	38.0
SLO/A[1]	27.9	24.0	26.3	7.4	27.6
SLO/H[1]	7.6	6.0	6.6	6.8	2.2
SLO/CRO	47.1	26.0	28.6	4.8	32.2
Total	100.0	91	100.0	7.8	100.0

1 – Proportion of total length of Slovenia's land border;
2 – Number of road border crossings, where the extent of cross-border traffic is recorded;
3 – Proportion of border crossings or border buildings
4 – Average number of border crossings per 100 kilometers of border;
5 – Proportion of total cross-border traffic (average for 1992–1998 period).
Source[1]: Processing of data from the Statistical Office of Slovenia

Friuli-Venezia Giulia that allowed gasoline to be purchased at the considerably lower »Slovene« price in the Italian border zone. Traffic over Slovene-Austrian border crossings also increased between 1992 and 1995 and then stabilized at about 50 million crossings annually. The largest relative increase in cross-border movement was recorded on the Slovene-Hungarian border, which had been almost hermetically sealed until the early 1990's. Between 1992 and 1995, border traffic increased here by some 150% and then stabilized at about 4 million crossings annually. A major oscillation on the annual level is recorded for cross-border movements on the Slovene-Croatian border, which reached a maximum in 1994 with 66 million crossings, almost a third more than in 1992, decreased greatly in the following year, and then began to rise again in the last few years.

It is clear from Table 2 that relative to the length of the border, the mean cross-border traffic is of above-average intensity on the Slovene-Italian border, which comprises only 17% of the total border length but records some 38% of all border traffic, in proportion with the length of the Slovene-Austrian border, and below average for the borders with Croatia and Hungary. Of all the borders, the Slovene-Italian border is the most accessible or furnished with border crossings, since almost 40% of all Slovenia's border crossings are in this border sector, on average more than seventeen border crossings per 100 kilometers of border. This figure is even higher in the southern part of the Slovene-Italian border where the density of border infrastructure rises to twenty-five border crossings per 100 kilometers of border or one border crossing every four kilometers, while the general Slovene average totals less than eight crossings per 100 kilometers of border. Only the Slovene-Austrian and Slovene-Hungarian border sections with about 7 border crossings per 100 kilometers of border approach this average, while the Slovene-Croatian border section remains below-average »equipped« with border infrastructure with less than five border crossings per 100 kilometers of border.

We should draw attention to the fact that two European traffic corridors cross Slovenia: Corridor 5 on the Milan–Trieste–Ljubljana–Budapest route and Corridor 10 on the Nürnberg–Graz–Maribor–Zagreb route. The transit importance of Slovenia relative to linking Europe's west and north with its south and east will undoubtedly be further reinforced in future with the construction of a suitable road and rail network, and at the same time, the possibilities for the integration of border regions, which are now entirely included in the Interreg programs, will increase as well.

Conclusion: Slovenia as Europe's »Integration Laboratory«

Cross-border integration depends on a number of factors, including wider geopolitical conditions and the diverse history of individual border sectors, inter-state political and economic relations, border accessibility, the degree of social and cultural affinity, regional conditions, and the dynamics of socio-economic development in border regions (Klemenčič and Bufon 1994). In the case of Slovenia, previous research shows that a combination of international factors such as an increase of business exchanges, tourist streams, and transit traffic and regional factors that are primarily related to the flow of people, goods, and communications in the framework of border regions leads to the more comprehensive development not only of individual traffic corridors or border centers but also of the wider border area. In this way, different border areas along Slovenia's borders have already developed into true border regions, even though, in contrast to other Euro-regions, they are still not based on institutional but rather on spontaneous forms of cross-border links, which also occupy a smaller territorial area (Bufon 1998). The considerable influence of local factors is therefore characteristic of them, originating more from common territorial bonds than in the international political and economic demands of any given moment. Here, we observe the seemingly paradoxical fact that those border areas which have experienced the greatest problems relative to the splitting of previously unified administrative, cultural, and functional space in the recent past also have the greatest possibilities for developing into border regions.

In this sense, border areas and the cross-border relations developing in them have great significance not only in the field of social and economic integration at the inter-state and inter-regional levels but also in the preservation of cultural characteristics and the strengthening of inter-ethnic coexistence and links. In border areas, all this opens up a series of new aspects that are becoming increasingly important in the process of European integration, the abolition of the traditional functions of political borders, and the greater appreciation of mutual understanding in the culturally very diverse European space. After Slovenia joins the European Union, along with planning the social and spatial development of border areas, it will be necessary to think more thoroughly about Slovenia's new role as a border country between the European Union and the Balkans from the viewpoint of its political and economic geopolitical integration and its effects on internal regional development. In short, it appears that Slovenia, considering its size and its properties as a European contact territory, might be a very suitable and handy »laboratory« for studying integration processes in conditions of preserving cultural diversity as well as for its spatial and social influences on the »new« and »old« border areas of Central Europe.

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RELIEF

Matej Gabrovec
Mauro Hrvatin

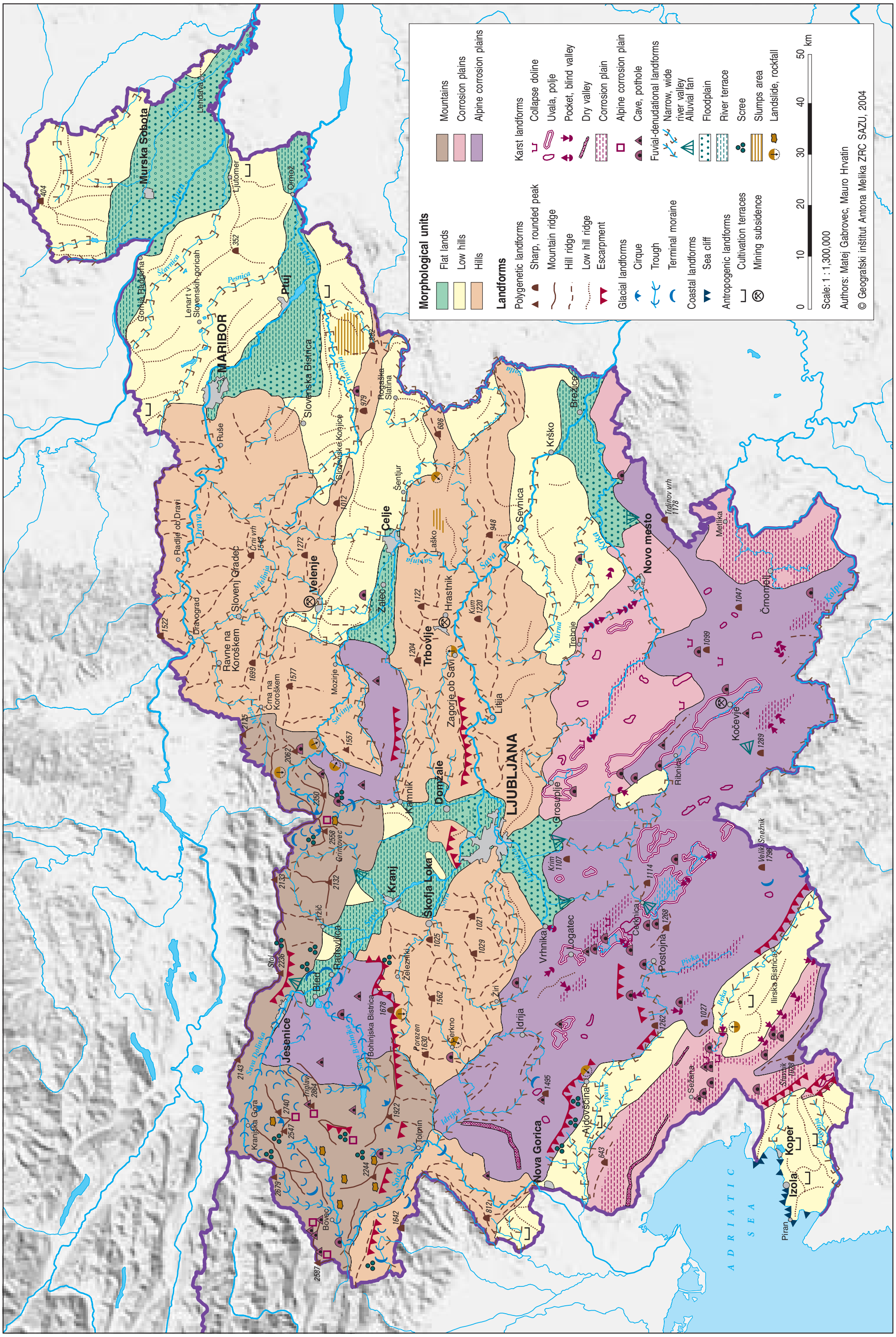
In the middle of the Pliocene, the relief of today's Slovenia was still predominantly level, mainly due to strong chemical weathering and abundant denudation in the moderately humid and warm climate of the time. From this period, numerous flatlands still remain today. The geomorphological processes that leveled the landscape ceased with the tectonic and climate changes in the upper Pliocene and in the Pleistocene. Due to the gradual cooling of the climate, mechanical weathering increased in the upper Pliocene and primarily reduced the surface areas of impermeable rock, which were then much more widespread than they are today. Through vertical and lateral erosion, the rivers carved deep valleys, above which the remains of former terraces have survived. Even greater changes occurred with the frequent climate changes in the Pleistocene. The temperature dropped in the cold periods by more than 10° C, and therefore glaciers formed in the mountain areas. Frequent freezing caused extremely strong mechanical weathering. The rivers deepened their valleys by 100 to 300 meters and at the same time filled young tectonic depressions with huge amounts of gravel. In the Holocene, the initially very rapid river erosion was followed by periodic accumulation of material from the upper parts of the valleys (Šifrer 1994).

According to the geomorphological development in Slovenia, we distinguish fluviodenudational, glacial, karst, and coastal relief.

In some areas, the genetic types of relief intertwine. In the mountains, for example, that were reshaped by glaciers in the Pleistocene, the chemical weathering of carbonate rock dominates today and we speak of glacial-karst relief (Gabrovec and Hrvatin 1998).

Fluviodenudational relief has developed on areas of impermeable rock. Within this type, we further distinguish destruction and accumulation relief. Characteristic of destruction fluviodenudational relief is the interweaving of valleys and intervening ridges. In the mountainous area, rivers in some places carved their riverbeds in the shape of narrow and deep gorges. The small Mlinarica and Mostnica rivers in the Julian Alps, for example, carved gorges several dozen meters deep. Characteristic of mountainous areas are ravines such as Iški vintgar and the valley of the Hudinja River below Vitanje. In hilly areas, the valleys are usually wider and have alluvial bottoms, for example, the valleys of the Pesnica and Ščavnica rivers in Slovenske Gorice. On slopes covered by a thicker layer of weathered debris and soil, slumps are frequent. They are most frequent in Kozjansko and Haloze, where they are triggered mainly by heavy rains. Landslides are more frequent on less resistant sediment in the subalpine hills**.** Among the largest belong landslides in the upper Savinja Valley, the Posočje region, and below Kladje Pass in the Cerkljansko Hills. Rockfalls and debris flows are periodically triggered from mountain walls and the steep rocky slopes of mountain valleys. The best known in recent years are the rockfalls in Trenta and the debris flow triggered in the Mangart mountain chain that partially destroyed the village of Log pod Mangartom (Zorn and Komac 2002).

Accumulation fluviodenudational relief occurs on plains and basins and on the bottoms of wider valleys and karst poljes. This relief was formed by rivers that deposited several dozen meters of gravel, sand, or clay in tectonic depressions. Rivers that had their watersheds in glaciated areas during the Pleistocene deposited large quantities of material in the cold periods and carved out riverbeds in it during the warmer periods. Numerous fluvioglacial terraces are the result of the many alternations of cold and warm periods and the corresponding depositing and carving by the rivers. The best-preserved terraces are found in Dobrava between Radovljica and Kranj. On older terraces, limestone pebbles


Morphological units
Flat lands
Low hills
Hills
Mountains
Corrosion plains
Alpine corrosion plains
Landforms
Polygenetic landforms
Sharp, rounded peak
Mountain ridge
Hill ridge
Low hill ridge
Escarpment
Glacial landforms
Cirque
Trough
Terminal moraine
Coastal landforms
Sea cliff
Antropogenic landforms
Cultivation terraces
Mining subsidence
Karst landforms
Collapse doline
Uvala, polje
Pocket, blind valley
Dry valley
Corrosion plain
Alpine corrosion plain
Cave, pothole
Fuvial-denudational landforms
Narrow, wide river valley
Alluvial fan
Floodplain
River terrace
Scree
Slumps area
Landslide, rockfall
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Authors: Matej Gabrovec, Mauro Hrvatin
© Geografski inštitut Antona Melika ZRC SAZU, 2004
LJUBLJANA
MARIBOR
Murska Sobota
Ptuj
Celje
Velenje
Kranj
Novo mesto
Koper
Izola
Piran
Nova Gorica
Jesenice
ADRIATIC SEA

◄ *Figure 1: Morphological units and landforms.*

agglutinated into conglomerate, which in places such as the Udin boršt terrace near Kranj is already well karstified. The thickness of Quaternary alluvium in the areas of accumulation fluviodenudational relief varies substantially, from five to two hundred meters. Where narrow valleys open onto wider valleys or plains, the rivers deposited alluvial fans. Among the larger ones are the Šentjernej fan, which was created by streams coming from the Gorjanci mountain range at the edge of the Krška ravan plain, and the fan of the Iška River at the junction of Iški vintgar and the Ljubljansko Barje moor. Accumulation relief also occurs at the foot of some steep slopes where extensive fossil and recent screes are found.

Glacial relief appears in the mountainous areas, where it originated due to glacial erosion and accumulation in the colder periods of the Pleistocene. Cirques formed high in the mountains below rocky ridges. Larger cirques include Za Akom and Pod srcem in the Julian Alps above Gozd Martuljek and Okrešelj above the Logarska dolina valley in the Kamniške-Savinjske Alps. Glaciers filled former river valleys and reshaped them into U-shaped glacial valleys with broad flat bottoms and steep sides. The effects of glacial erosion are most distinctive in watershed areas of the valleys of the Sava Bohinjka, Soča, Kamniška Bistrica, and Savinja rivers. Smaller glaciers also left traces at places in the Karavanke Mountains and in the Trnovski gozd and Snežnik regions. Terminal moraines mark the outer margins of the former glaciers. On formerly glaciated areas, denudation and karstification dominate today. The glaciers below Mount Triglav and Mount Skuta are not the remains of Pleistocene glaciation since they only formed in the colder period of the Holocene. Because each of them only covers a few hectares, their influence on the formation of the surface is insignificant.

Karst relief is characteristic primarily of the Dinaric and Alpine areas. Common characteristics of karst are the intensive chemical weathering of the rock and the underground karst flow of the waters. On the basis of the hardness or mineralization of karst waters, it was determined that the karst surface in Slovenia lowers by two to ten millimeters per century, less on barren karst and more on karst areas covered by soil (Gams 2003).

We distinguish between limestone karst and dolomite karst relief. The characteristic surface of limestone karst is composed of karst depressions and rounded peaks. The most frequent karst depressions are dolines. In places, their density is extremely high; for example, on the Vrtače and Šahen flats in Ribniško polje and Kočevsko polje, there are more than two hundred dolines per square kilometer. The larger karst depressions include uvalas and karst poljes. In Notranjska, the best known are Cerknica polje and Planinsko polje, and in Dolenjska, Ribniško polje and Kočevsko polje. Slovenia's largest karst corrosion plain is in Bela krajina, a several-kilometer long and wide flat surface that is heavily dotted with dolines. Where waters flow from impermeable rock onto limestone bedrock, blind valleys developed, for example in the limestone Podgrajsko podolje along the streams flowing down from the flysch Brkini ridge. Around the karst springs of the Ljubljanica, Unica, and Krka rivers, pocket valleys were formed that end in steep slopes or even vertical walls. Because of the course taken by the karst waters, numerous caves and shafts were formed in the underground. The largest caves in Slovenia occurred near the sinkholes of major rivers. The Postojna cave system and Planinska cave were formed by the Pivka River, and the Škocjan Caves and Kačna jama Cave by the Reka River. The deepest shafts explored so far, over 1,000 meters deep, are found on Mount Rombon and Mount Kanin and on the Dleskovška plateau. With a depth of 1,533 meters, the Čehi 2 shaft on Rombonski podi is among the ten deepest shafts in the world. Due to the collapse of the ceilings of karst caves, deep depressions were formed on the surface. Among those above the underground streams in the watershed of the karst Ljubljanica River are the 124-meter deep Unška koliševka collapse depression and the Laška kukava collapse depresion. Enclosing a space of 2.75 million m^3, the latter is the largest in Slovenia. Although underground waters dominate in karst regions, some rivers such as the Kolpa and Krka flow on the surface. Among dry valleys, the most distinctive is the Čepovan Valley between the plateaus of Banjšice and Trnovski gozd.

Surface karst forms are more rare on dolomite karst, and therefore this type of karst relief is usually less distinctive than limestone karst relief. Larger karst caves such as Jama near Sveti Trije kralji near Rovte are also relatively rare. Small and shallow dry valleys called dells are characteristic. Along with the chemical dissolving of the rock, erosion and denudation also play an important role on dolomite and therefore dolomite karst relief in many places resembles fluviodenudational relief. This type of relief, characteristic of the watershed of the Temenica River, is often called »fluviokarst«. Due to its lack of resistance to mechanical weathering or brittleness, erosion foci are frequent on dolomite.

The coastal type of relief is limited to a narrow belt along Slovenia's Adriatic coast. The most distinctive relief features are overhanging cliffs up to seventy meters high formed by abrasion erosion and eroded at their feet by the waves. The largest cliffs rise between Izola and Piran. Along the coast below the surface of the sea spreads a several-dozen-meters wide abrasion terrace that ends in a sharp edge at the depth of nine meters (Orožen Adamič and Rejec Brancelj 1998).

In many places the geological structure is clearly visible in the relief. This applies above all to larger geological structures, among which we include faults, folds, and thrusts. In many places, river valleys have been carved in tectonically damaged rock along faults. The Soča and Idrijca rivers carved part of their valleys along the Idrija fault, and on karst, the Notranjska valley system formed with numerous karst poljes. A folded area can be reflected in the form of a parallel oblong series of ridges and valleys, for example in the Posavsko Hills. In some places, the fronts of thrusts are visible as distinctive relief levels. The steep limestone slope of Trnovski gozd above the flysch Vipava Valley is the front of the Trnovo thrust.

Human intervention is increasingly evident in the relief. Among the most important anthropogenic relief features are transportation right of ways, quarries and other excavations, and cultivation terraces. Major changes in relief occur due to the subsidence of the ground above abandoned mine shafts. The worst consequences of subsidence due to coal mining are visible in the vicinity of Velenje and Trbovlje. Lakes developed where groundwater filled the subsidences over mines. Cultivation terraces that made cultivation easier and simultaneously reduced soil erosion on slopes are frequent in the hills above Koper.

Along with the relief features described above, which more or less incontrovertibly fall into individual genetic types of relief, there is a multitude of those that developed due to the interaction of various geomorphological processes and are therefore called polygenetic features. Among the more typical relief features of this kind are variously shaped peaks, ridges, and slopes.

Relative to the dissection of the surface, we distinguish six types of relief: plains, low hills, hills, mountains, and low and high plateaus. Plains developed through accumulation processes. Today, accumulation occurs only on the youngest flood plains of rivers and streams. Older conglomerate terraces are already karstified. In the low hills and hills, denudation and erosion processes dominate. These two relief types are distinguished according to the differences in altitude between the ridges and the valleys: in low hills, they reach 300 meters at most, and in hills, between 300 and 1,000 meters. In the mountains, the peaks and ridges reach above the tree line. In Slovenia, the tree line is at around 1,700 meters. The mountains were glaciated during the Pleistocene, and numerous glacial features have survived. Today, fluviodenudational and karst processes dominate here. The low hills, hills, and mountains are dissected by numerous valleys, but on plateaus valleys are found only exceptionally due to the dominant karst processes. On plateaus, rounded peaks alternate with various karst depressions. Low plateaus reach up to 700 meters above sea level, while on high plateaus the peaks reach over 1,000 meters.

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WATERS

Mauro Hrvatin

Slovenia is a country characterized by an abundance of water in a great variety of forms. We usually distinguish between surface and subterranean land waters and the sea. Surface land waters include the river network, lakes, marshes, moors, snowfields, and glaciers while subterranean land waters include groundwater, karst, thermal, and mineral waters.

The river network consists of a multitude of rivers, streams, and brooks totaling almost 27,000 kilometers. The average density of the watercourses in Slovenia is 1.33 kilometers per square kilometer, among the highest density found in Europe. Surface watercourses are not equally distributed because about 40% of Slovenia is karst and therefore almost without surface watercourses. In this regard, some Slovene karst plateaus stand out especially. In contrast to the karst regions, elsewhere the river network is very branched and in places the density of watercourses exceeds three kilometers per square kilometer.

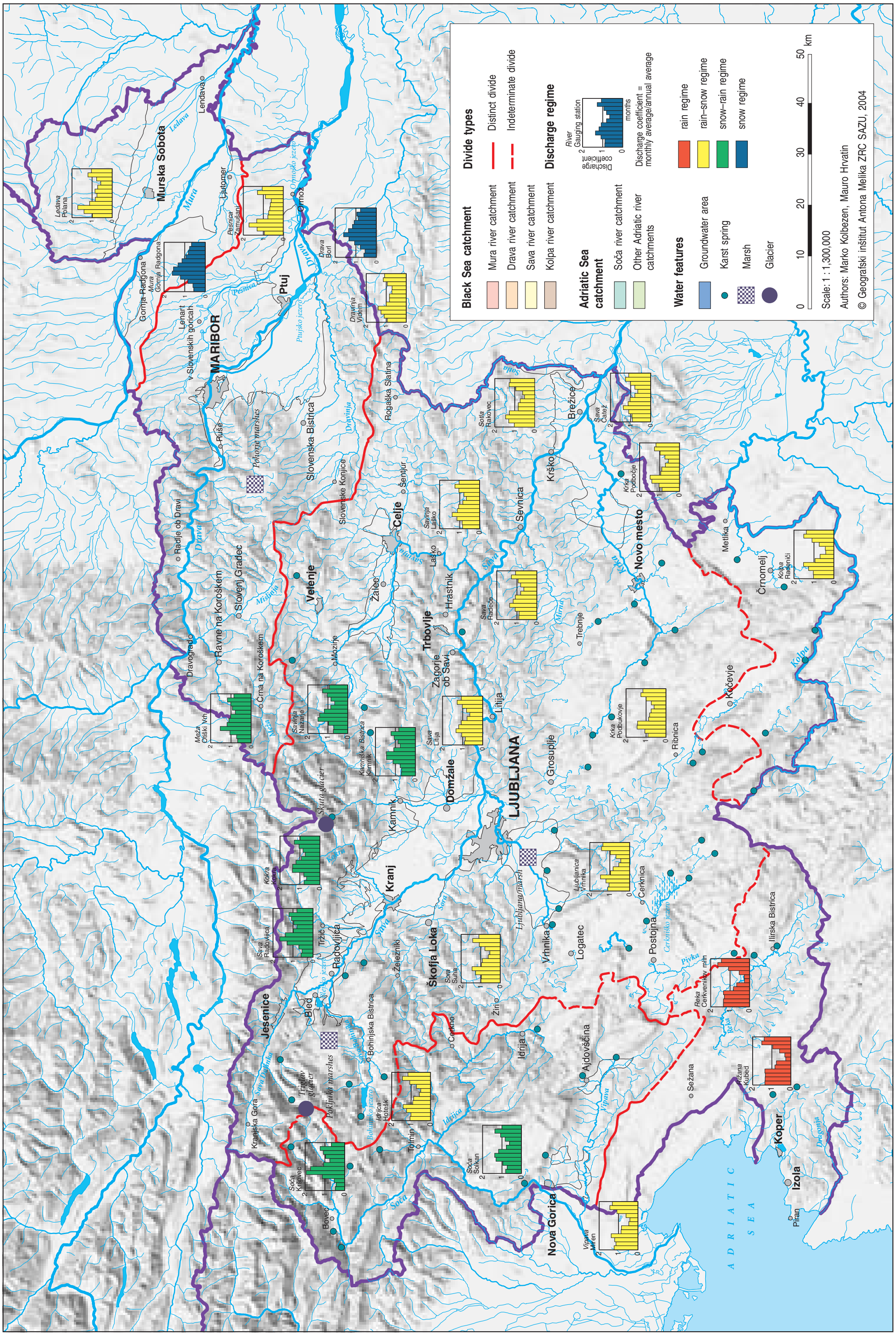
The divide between the Black Sea and the Adriatic Sea runs across Slovenia. Rivers from four fifths of Slovene territory flow several hundred kilometers to the Black Sea and from less than one fifth to the Adriatic Sea. The Black Sea river system comprises the watersheds of the Mura, Drava, Sava, and Kolpa rivers, while the Adriatic river system includes the watersheds of the Soča and Reka rivers and of the small rivers that flow directly to the sea.

Short watercourses are characteristics of Slovenia's water network, and only forty-six rivers are more than twenty-five kilometers long. The longest river is the Sava, which runs 221 kilometers on Slovene territory, followed by the Drava with 142 kilometers and the Kolpa with 118 kilometers. The longest rivers that flow their entire length within Slovene territory are the Savinja (102 km) and the Krka (94 km). The Mura, Soča, Sotla, Ledava, Dravinja, Pesnica, Idrijca, Ščavnica, Reka, and Sora (together with the Poljanska Sora) rivers all have more than fifty kilometers of their length on Slovene territory or along the national borders.

According to the volume of water, the Drava takes first place with an average annual discharge of 322 m^3/s at Dravsko polje. The discharge of the Sava near Čatež (289 m^3/s) is close behind, while the discharge of the Mura near Gornja Radgona (157 m^3/s) is already smaller by half. The Soča, Kolpa, Ljubljanica, and Krka rivers have average annual discharge of more than 50 m^3/s.

In Slovenia, the average annual precipitation is 1,570 mm. Of this, 42% evaporates and the remaining 58% runs off via watercourses. Runoff coefficients indicating the proportion of water flowing into watercourses differ considerably according to the individual regions of Slovenia. The differences are caused primarily by the quantity and the regime of the precipitation and the rock and relief characteristics in the regions. The highest runoff quotients, which exceed 80%, are found in the Upper Posočje region. In most of the country, they range between 40% and 60%. The lowest values are found in Prekmurje where they only rarely exceed 30% (Kolbezen 1998).

According to the average oscillation in the discharge during the year, we distinguish four types of discharge regimes. The snow regime is characteristic of the Drava and Mura rivers, whose watersheds extend into the glaciated and snow-covered high mountains of Hohe and Niedere Tauern in Austria. The single discharge maximum occurs at the transition of the spring into the summer, and the minimum in the winter. The snow-rain regime is characteristic for the alpine Kamniška Bistrica, Tržiška Bistrica, Kokra, Koritnica, Meža, Radovna, and Tolminka rivers and the upper reaches of the Sava, Savinja, and Soča. The primary discharge maximum occurs with the thawing of snow in late spring, and the secondary maximum occurs during the fall rains. The winter discharge minimum is more distinct than the summer one. The rain-snow regime is characteristic of the Dravinja, Idrijca, Kolpa, Krka, Ledava,


Black Sea catchment
Mura river catchment
Drava river catchment
Sava river catchment
Kolpa river catchment
Adriatic Sea catchment
Soča river catchment
Other Adriatic river catchments
Water features
Groundwater area
Karst spring
Marsh
Glacier
Divide types
Distinct divide
Indeterminate divide
Discharge regime
Discharge coefficient = monthly average/annual average
rain regime
rain–snow regime
snow–rain regime
snow regime
Scale: 1 : 1,300,000
Authors: Marko Kolbezen, Mauro Hrvatin
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◄ *Figure 1: Inland waters.*

Ljubljanica, Mirna, Pesnica, Sora, Sotla, Ščavnica, and Vipava rivers and in the lower stretches of the Sava, Savinja, and Soča. The spring snow discharge maximum always exceeds the fall rain maximum, but the summer discharges are substantially lower than those in winter. The rain regime is characteristic for the Pivka, Reka, and Rižana rivers in southwestern Slovenia. Above-average discharges occur here in the colder half of the year from November to April, while in late spring and summer the discharges are modest due to high temperatures and strong evapotranspiration (Hrvatin 1998).

With heavier and longer rains, floods occur along numerous watercourses, threatening about 500 km^2 of land. The largest flood areas are on the Ljubljansko Barje moor (80 km^2) and along the Dravinja (66.5 km^2) and Krka (62 km^2) rivers. Flood areas larger than 20 km^2 are also found along the lower stretches of the Savinja and Sava, along the Sotla and Kolpa, and on Cerkniško polje.

Floods can be regular, occurring according to the river regime at specific times of the year, and have an anticipated spread, for example, the annual floods along the Krka River, on the Ljubljansko Barje moor, and on Planinsko polje. Extraordinary floods occur at unusual times of the year and have an exceptional spread or impact. Destructive floods struck the river basins of the Idrijca, Sora, Kamniška Bistrica, Savinja, Meža, Dravinja, Pesnica, Ščavnica, and Sava rivers in 1990. To protect the land from floods and erosion, extensive regulation work has been undertaken in Slovenia for more than a hundred years (Orožen Adamič 1998).

In the past, the power of rivers was harnessed by more than 4,000 water-driven flourmills and sawmills, but most of these were abandoned in the 20th century. They were replaced by hydroelectric power plants that produce more than one third of Slovenia's electric energy supply. River water is also used for cooling in thermoelectric power plants and the nuclear power plant in Krško, as technological water in industry, and for irrigation. Due to the pollution of the river water, it can no longer be used directly for the supply of drinking water (Bat and Uhan 1997).

Natural lakes in Slovenia are rare and small, and are divided into glacial and karst lakes. The largest and best-known glacial lakes are Lake Bohinj and Lake Bled. Lake Bohinj measures 3.18 km^2 and has a maximum depth of 44.5 meters. It is a discharge type, so its water is quickly renewed. Lake Bled, with a surface area of 1.40 km^2 and a maximum depth of 30.6 meters, is somewhat smaller. In the high mountains of the Julian Alps, there are several smaller glacial lakes, among which the Triglav lakes, Kriška lakes, and Krn lakes are best known.

The disappearing Cerknica Lake measures 21 km^2 during normal flooding, and with exceptionally high waters its surface area exceeds 28 km^2. On average, it lasts for almost ten months of the year. It usually fills up during the fall rains and disappears only in the summer months of the following year. Only a few karst lakes never disappear. One such lake is Jezero near Podpeč below Mount Krim, which is Slovenia's deepest lake with a depth of 47 meters.

Artificial lakes include reservoirs beside hydroelectric power plants, multi-purpose water reservoirs, and lakes that developed in depressions above abandoned mines.

Marshes are areas where the ground is waterlogged. In recent decades, their surface area has been rapidly shrinking due to intensive drainage. Larger hydromeliorations of marshy areas were carried out along the Ledava, Mirna, Mura, Pesnica, Polskava, Ščavnica, and Vipava rivers and along the lower course of the Krka River. In 1990, marshes together with fishponds and reed ponds occupied only 2,200 hectares.

A moor is a special kind of marshland with vegetation whose dead remains are deposited as peat. One well-known moor is Zelenci near the source of the Sava River, while the once much larger Ljubljansko Barje moor was destroyed to a great extent by the cutting of peat.

Snowfields and glaciers are an important and simultaneously very changeable element of the high-mountain areas. Comparisons between various historical sources and the current situation show that the number and size of formerly frequent and large mountain snowfields are decreasing. The glac-

iers on Mount Triglav and below Mount Skuta have also been rapidly shrinking in recent decades. The Triglav glacier, which covered almost 46 hectares in the 1880's, has dwindled today to a mere 1.4 hectares.

Subterranean waters, which include groundwater, karst, thermal, and mineral waters, greatly surpass surface waters in quantity. The sites of groundwater are basins and river valleys with thick deposits of Tertiary and Quaternary gravel and sand alluvia. The most important sites are the Apače, Mura, and Ljutomer poljes in the Mura watershed; the Dravsko-Ptujsko polje in the Drava watershed; the Ljubljana, Kranj-Sora, and Krško-Brežice poljes and the Kamniška Bistrica and Lower Savinja valleys in the Sava watershed; and the Vipava Valley and the Soča polje in the Soča watershed (Kolbezen 1998).

At the moment, groundwater supplies more than half of Slovenia's drinking water. Because the basins are very densely populated, crisscrossed by traffic arteries, and intensively cultivated and at the same time polluted rivers are directly linked to the groundwater, there is a great and constant threat of pollution hanging over this important natural resource, either directly from the surface or indirectly from the rivers. The pollution of the groundwater could prohibit its use in the public water supply for years or even decades. The greatest threat of groundwater pollution occurs during droughts because the dropping level of the water table allows the penetration of polluted river water into the gravel and sand (Natek and Natek 1998).

Karst waters feed the springs of the Soča, Sava, Idrijca, Vipava, Ljubljanica, Krka, and Kolpa rivers and many of their tributaries. Some karst springs such as the Rižana, Malenščica, Podroteja, and Mrzlek springs are vital for the water supply of entire areas. During droughts, they represent three quarters of all the available water supplies.

Thermal and mineral waters are special types of subterranean water. So far, twenty-four natural thermal and thermo-mineral springs with temperatures between 18° C and 38° C have been discovered. Thermal waters are exploited mainly by the health resorts at Čatež, Dolenjske Toplice, Šmarješke Toplice, Podčetrtek, Ptuj, Rimske Toplice, Topolšica, and Zreče. The most important locations of mineral water are in porous Tertiary sand and gravel (Radenci) and in tectonically fissured rock (Rogaška Slatina). In the western part of Pomurje, there are extensive sites of thermo-mineral water containing dissolved CO_2 at depths between 700 and 1,300 meters.

In addition to land waters, a small part of the Adriatic Sea including part of the Bay of Trieste and forty-seven kilometers of coastline belongs to Slovenia. While the Slovene share of sea surface is insignificant, the economic and geopolitical importance of the sea is incomparably greater. The Slovene sea is very shallow and only rarely exceeds the depth of twenty meters. It is deepest in the undersea basin off Piran, where it is thirty-seven meters deep. The average annual temperature of the sea is 15.8° C, the lowest is 8.1° C in February, and the highest is 24.0° C in August. Due to the abundant influx of fresh water, its average saltiness is lower than the Adriatic average and oscillates between 33‰ and 38‰. The currents are weak, and the amplitude between the mean low tide and mean high tide is only sixty-six centimeters on average (Bat and Uhan 1997).

Due to its small size and closed character, the Bay of Trieste ranks among the most polluted parts of the Adriatic Sea. About 400,000 people live along the shoreline, and communal waste is joined by the waste generated by industry, maritime traffic, tourism, and, to a lesser degree, agriculture. A large influx of organic and inorganic material comes also from the Po River (Natek and Natek 1998).

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THE TRIGLAV GLACIER

Matej Gabrovec
Borut Peršolja

The Triglav Glacier is located in the Julian Alps at the altitude of 2,445 meters. The last hundred years of its half a millennium history has been marked by a retreating trend. The situation of the last four hundred years can be reconstructed by studying older moraines whose age has been established according to the overgrowth of the blue-green algae *Chroococcus lithophilus* Erceg (Šifrer 1963), by studying old paintings and photographs, and on the basis of individual mentions, particularly in the mountaineering literature. Fieldwork findings match the preserved descriptive and photographic mate-

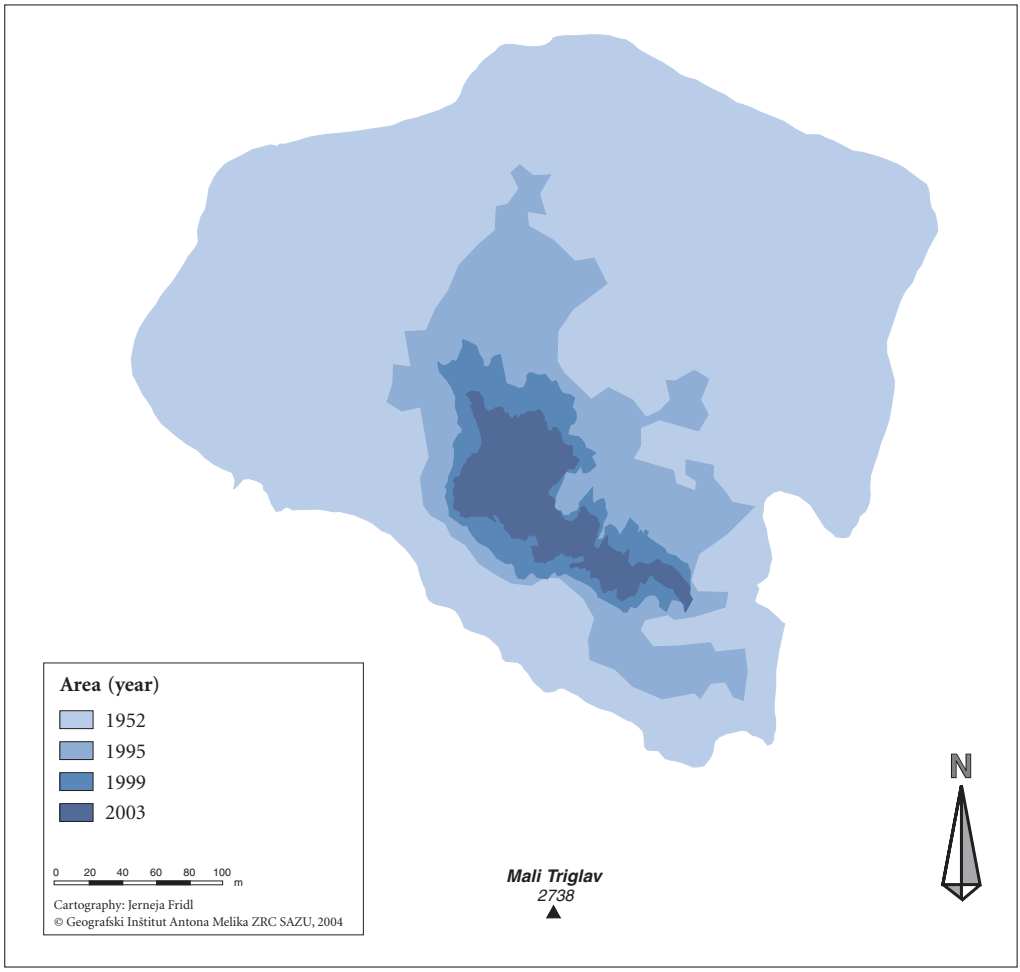

Figure 1: The size of the Triglav Glacier in 1952, 1995, 1999 and 2003.

rials very well. In the last fifty years, the Triglav Glacier has been the subject of constant observations and research (since 1946) and this work ranks among the oldest uninterrupted scientific studies in Slovenia.

Table 1: Survey of the surface area changes of the Triglav Glacier.

Year	Surface area in hectares	Altitude of the upper edge	Altitude of the lower edge
1900	32	2600	2280
1952	12.5	2565	2390
1995	3.0	2545	2415
1999	1.1	2510	2440
2003	0.7	2495	2445

Data on the surface area of the Triglav Glacier – including the oldest in the course of more than fifty years of uninterrupted monitoring and measuring – has been acquired in various ways. At first, annual measurements included measuring the distance from the ice to measurement points placed by the researchers on the margin of the glacier. Periodically, classical geodetic measurements were made with a theodolite, the first in 1952, and later in 1995 and 1999.

In 1999, we took the first aerial photos using a photogrammetric camera in the usual stereo technique. The shooting was successful, and the data enabled the high quality processing and presentation of a three-dimensional model of the glacier. We therefore repeated the aerial photography in 2001 and 2003, and on the basis of helicopter shots, 1:1,000-scale digital topographical plans of the Triglav Glacier and a digital model of heights were elaborated for all shootings.

We first used the ground penetrating radar on the Triglav Glacier in 1999 (Verbič, Gabrovec 2002). On two cross-sections, we acquired data on the formation of the slope or basin where the glacier is situated. In 2000, we again took georadar measurements on 14 cross-sections and upgraded the data on the sub-glacier surface. The three-dimensional data on the surface of the glacier, together with the data on its thickness, enabled us to calculate its volume in individual years. If the surface of the glacier shrank to one twentieth of its original size in half a century, its volume shrank to less than one hundredth of the original volume.

Figure 2: The Triglav Glacier, 1975 (photography Milan Orožen Adamič).

Figure 3: The Triglav Glacier, 2003 (photography Matej Gabrovec).

Table 2: Survey of volume and thickness changes of the Triglav Glacier.

Year	Volume in m^3	Greatest depth in m	Average depth in m
1952	1,700,000	45	18
1992	130,000	20	6
1999	35,000	10	3

In 1976, we began taking pictures of the glacier regularly, about once in a month, from two permanent positions in the vicinity of the Triglavski dom Lodge on Mount Kredarica (2,515 m). More than four thousand pictures allow us to monitor the condition of the glacier during the year and to make comparisons between individual years. At the end of the 1990's, the methodology of photogrammetric processing was applied to the photographs and an elaboration of a plane model of the surface of the glacier in different periods was done (Triglav, Kosmatin Fras, Gvozdanovič 2000).

In its present condition, the Triglav Glacier no longer deserves its name. All the typical characteristics of a glacier are changing or even disappearing. With the reduction of the thickness and surface area of the glacier, the structure of the ice has changed. For the formation of glacier ice with a volume density of 870–910 kg/m^3, the decisive factors are a sufficient quantity of snow precipitation, the duration and manner of transformation, and the weight from the top on lower-lying layers. Bluish-green glacier ice is practically gone, replaced by thicker and darker water ice that only needs a continuous weight to complete its transformation.

Visible proof of the movement of the glacier are glacier fissures, which occur due to the differences in the velocity of different parts of the glacier. These are clearly visible in old photographs from the beginning of the 20th century, as well as in scenes from the first Slovene movie, *V kraljestvu Zlatoroga/In*

the Kingdom of the Goldenhorn, made in 1931. It is obvious that in the last few years, the glacier has no longer moved since the last glacier fissure was observed in October 2001. Gravitational movement (consecutive as well as regelation movement) has stopped due to the physical entrapment of the glacier in a shallow bowl (Peršolja 2003), which we were able to identify on the subglacier surface using georadar measurements.

In the second half of the 1980's, the glacier divided into many smaller parts. The disintegration of the glacier was followed by the covering of individual parts by rubble (Gabrovec 1998). This means that the Triglav Glacier will probably not thaw entirely since the rubble deposits will protect it and convert it into fossilized or trapped ice (Peršolja 2003).

The annual changing of the glacier is the consequence of a complicated combination of the effects of various climatic factors in the warm and cold halves of the year, its thawing and growing periods. Changes over a longer period are also the result of global climate changes. Cooling during the transition from the Middle Ages to the Modern Age (Little Ice Age) caused the occurrence of the Triglav Glacier. The rapid shrinking of the glacier in the last decade is undoubtedly connected to the rising temperature in this period. The data from the meteorological station on Mount Kredarica (2,514 m) in the immediate vicinity of the glacier is clear proof of this (Nadbath 1999). On the other hand, abundant snow precipitation in 2001 (Vrhovec, Velkavrh 2001) temporarily stopped the shrinking of the glacier, and a similar event happened in the 1970's (Šifrer 1987).

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KARST IN SLOVENIA

Nadja Zupan Hajna

Word kras (karst) entered to international scientific terminology from Slovenia; and also some other words like dolina, polje ect. Kras is a low carbonate plateau between Divača, Sežana and Trieste, and from there the technical term derives. The term karst – kras has a pre-indoeuropean origin from word karra, which means rock – stone. The ancient word for »stone« gave the origin to the ancient name for the region (Carusadus, Carsus) and this word changed according to different languages into Kras (Slovene), Karst (German) and Carso (Italian). From this toponym the international term – karst – for such type of landscape is derived.

Kras, carbonate plateau, and its topographical and hydrological phenomena was becoming largely known after scientists and travels in last centuries published theirs descriptions about it. A lot of works were published in German language, so the translation of Kras to Karst entered into terminology denoting a special type of landscape.

Karst is developed everywhere where carbonate rocks are presented. In Slovenia karst covers 43% of the surface; 35% is on limestone and about 8% on dolomite, that is about 8.800 km^2. Karst is developed in carbonate rocks from Devonian to Miocene age. Jurassic and Cretaceous limestones are the most favourable for karstification in our region. In Slovenia, the prevalent limestones display great purity, for they contain a very insignificant amount (1–2%) of insoluble residue (Gams 1974, 2003, Ogorelec & Rothe 1993). According to Herak (1972), the limestones from the Dinaric Karst contain different parts of $CaCO_3$, with regard to the sedimentation conditions in the given period. Thus the Lower Triassic limestones contain from 80% to 95% of $CaCO_3$, Lower Cretaceous between 95% and 98%, while Upper Cretaceous contain from 98% to 100% of $CaCO_3$.

Our karst was not always green as it at the present. Less then hundred years ago there was bare landscape with grass and some bushes. That was due to different land use, for example pasturing was much more intensive.

One of basic properties of karst is underground waters drainage. All meteoric water very soon flow in the karst. In the past there was not enough drinking water so people collected water from roofs. At present people use big karst springs for water supply, about 50% of drinking water in Slovenia derives from karst waters.

Karst Types in Slovenia

Related to geological, hydrological and morphological conditions in Slovenia, karst is divided into three larger units (Habič 1969): Alpine karst, Dinaric karst and intermediary pre-Alpine and pre-Panonnian isolated karst which are subsequently, due to morphological and hydrographical properties, subdivided into smaller regions.

1. **Alpine karst**, high mountainous and mountainous karst in Julian, Savinjske Alps and Karavanke.
2. **Dinaric karst**, divided in high and low karst of Primorska, Notranjska and Dolenjska.
3. **Dinaric-alpine intermediary and isolated karst** in the area of Idrijsko, Cerkljansko and Tolminsko, Polhograjski Mountains, Posavske folds, Gorjanci Mountain in some other places of N Slovenia.

Alpine karst is presented in mountain region of NW and N part of Slovenia. Different parts are named after main mountain belts. Limestones and dolomites are from Devonian to Cretaceous age, but Triassic carbonate rocks prevail. Main tectonic structures are expended in E-W direction. In that

Figure 1: Alpine karst in NW Slovenia. The deepest Slovenian caves are presented in the area (photography Jurij Senegačnik).

Figure 2: Cerknica polje is the biggest karst polje in Slovenia. Intermittent lake is characteristic for the lowest part of the polje (photography Marjan Garbajs).

type of karst simple runoff of underground prevails (Habič 1969). All known surface karst features and caves may be found. For high mountain karst surface pavements, all kinds of karren, »kotliči« – small depressions with vertical walls, and konte – big dolines, are characteristic. There is also a lot of shafts and caves. In Julian Alps, on Kanin mountain, the deepest caves in Slovenia were found.

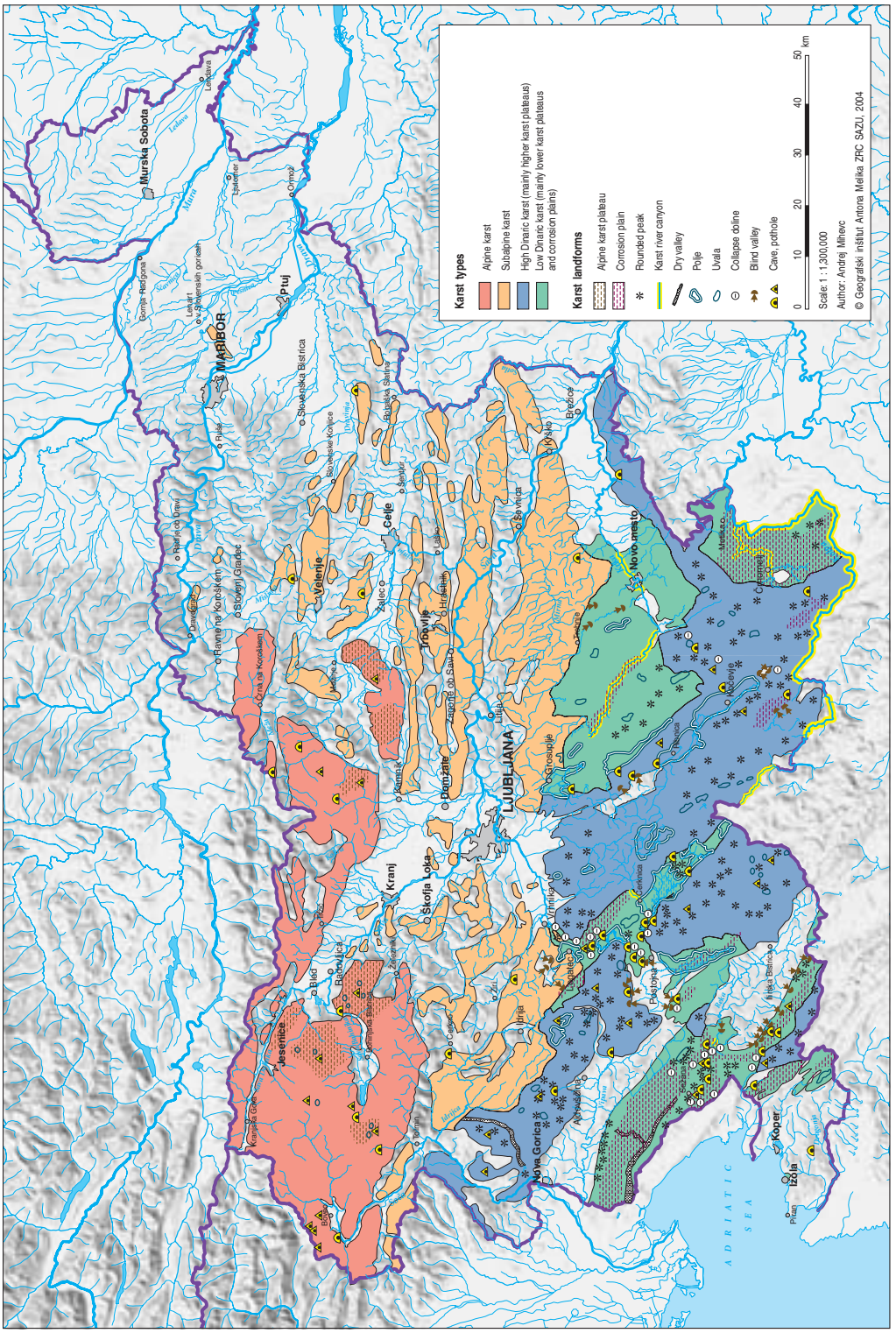
Dinaric karst is a karst with numerous dolines, karst poljes, levelled surfaces and plateaus (Kranjc 1997). It is divided in Low and High Dinaric karst. Low Dinaric karst is divided in littoral karst which is represented by Kras plateau and karst of inner Slovenia. Kras plateau has levelled surface with many dolines, collapse dolines and caves, with the most famous of them Škocjanske jame, Kačna jama, Labodnica ect. On its edges there is a lot of blind valleys. High Dinaric karst consist of high plateaus and large basins between them. Because of high altitude it is mostly forested. The longest and the most well known cave of this region is Postojnska jama.

Intermediary karst and isolated karst of middle part of Slovenia is developed in limestones and dolomites from Paleozoic to Neogene in the belt between Alps and Dinarids. The tectonic structures are in Alpine, E-W, and in Dinaric, NW-SE, directions. These karst units mostly belong to simple flow-off hydrographical regions. **Isolated karst** is represented by single shallow islands of limestones and dolomites of various ages in the central part of Slovenia, strongly differing in structure and hydrology (Habič 1969); this is why different hydrogeological types of isolated karst exist in this part of Slovenia. Pre-Pannonian isolated karst in the eastern part of Posavsko hribovje and Slovenske gorice is a special type of superficial and underground karst developed in the Miocene lithothamnian, marl and sandy limestones.

Karst Morfology

On the karst surface all types of **karren** are presented, from thin rillenkarren, to larger runnels and lapies (large karren) where the limestone surface is bare and exposed to precipitations. If karren were

Figure 3: Doline is the most common relief feature in the karst in Slovenia (photography Matej Gabrovec).


Karst types
Alpine karst
Subalpine karst
High Dinaric karst (mainly higher karst plateaus)
Low Dinaric karst (mainly lower karst plateaus and corrosion plains)
Karst landforms
Alpine karst plateau
Corrosion plain
Rounded peak
Karst river canyon
Dry valley
Polje
Uvala
Collapse doline
Blind valley
Cave, pothole
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Andrej Mihevc
© Geografski inštitut Antona Melika ZRC SAZU, 2004
Murska Sobota
MARIBOR
Ptuj
Slovenska Bistrica
Celje
Velenje
Trbovlje
Domžale
LJUBLJANA
Kranj
Škofja Loka
Jesenice
Novo mesto
Nova Gorica
Koper
Izola
ADRIATIC SEA

◄ *Figure 4: Karst surface.*

developed under soil cover they are rounded. Also some other features were developed under soil cover as notches and holes and for them smooth surfaces are characteristic.

Depressions are the predominant features on karst surface in Slovenia. There are all kinds, from small solution pits as kamenitza and doline, to large as big collapse dolina, uvala and polje.

Doline is maybe the most common morphological feature in our region. Usually they are solution forms. Dolines are presented in all karst types in Slovenia, but they are developed mostly on karst plains, there are few on slopes. Their bottoms are usually filed by soil and they are also protected against the wind bora. Because of these two reasons they are cultivated a lot of times.

Collapse dolines are much bigger then solution dolines and they indicate their connection to cave collapses. One of the biggest are in the area of Škocjanske jame caves and Divača village. There are Sekelak, Globočak, Risnik, Radvanj, ect.

The biggest karst depression is **karst polje.** Karst poljes are characteristic for Dinaric karst in South of Slovenia. Cerknica polje is the biggest of them. Cerknica polje is a karst polje developed in the important regional fault zone, Idrija fault, in »Dinaric« direction (NW-SE). In the same fault zone are developed also Planinsko polje, Loško polje and Babno polje. For the formation of karst polje in this fault zone along tectonic structures were the most important factor karst processes in the level of water table fluctuation in the bottom of the depression. Bottom of Cerkniško polje covers 38 km^2 in elevation of about 550 m and it is formed on Upper Triassic dolomite. On the polje borders are presented Triassic and Jurassic dolomites and Cretaceous limestones. Inflows are on E, S and partly on W sides of polje. The largest tributary to polje is Cerkniščica draining the dolomite catchment area. Stržen flows on the W side of polje towards the ponors in the middle of the polje, from where water flows directly to Ljubljanica springs, and towards NW side of polje, from where the water flows to Rakov Škocjan. From the foot of Javorniki mountain to the contact with dolomite in the polje bottom is 12 ponor caves. They are connected to Karlovica cave system to which also the highest waters from polje flows. It the system there is more the 7 km of passages. The intermittent lake covers about 26 km^2 when is full.

Another set of karst poljes is spread out SE of Ljubljana, in Dolenjska region.

Caves

At this moment is in Cave Register of Slovenian Speleological Association and Karst Research Institute more than 8.200 caves. They are horizontal and vertical, connected to cave systems, with active water flows to fossil ones completely filed by sediments. The longest is Postojna cave system with 20.5 km and the deepest is Čehi 2 with 1500 m in W Julian Alps on Kanin mountain. Deepest on single pit is Vrtiglavica with 643 m and the second is Brezno pod Velbom with 501 m in one single drop also on Kanin mountain.

One of very well known are also Škocjanske jame (Mihevc 2001), they are included in Unesco's World Heritage List because of their significance.

The Dinaric karst is inhabited by the richest obligate subterranean fauna in the World (Sket 2002) and the richest part of it in the aquatic (stygobiotic) fauna is in Slovenia. Postojnska jama cave is the type locality of first described cave animal, beetle *Leptodirus hochenwarti* and European cave salamander *Proteus anguinus.*

For tourist visit is arranged about 20 caves. Vilenica cave is probably the oldest documented tourist cave of the World. At the beginning of 17th century the landlord left over the income from the visitors to the parish priest of the church at Lokev. One of the most famous and oldest show caves is Postojnska jama cave where important tourist development started in 1818. Between the years 1818

and 1992 it was visited by 26.000.000 people. On of the most beautiful are Škocjanske jame with their large underground canyon.

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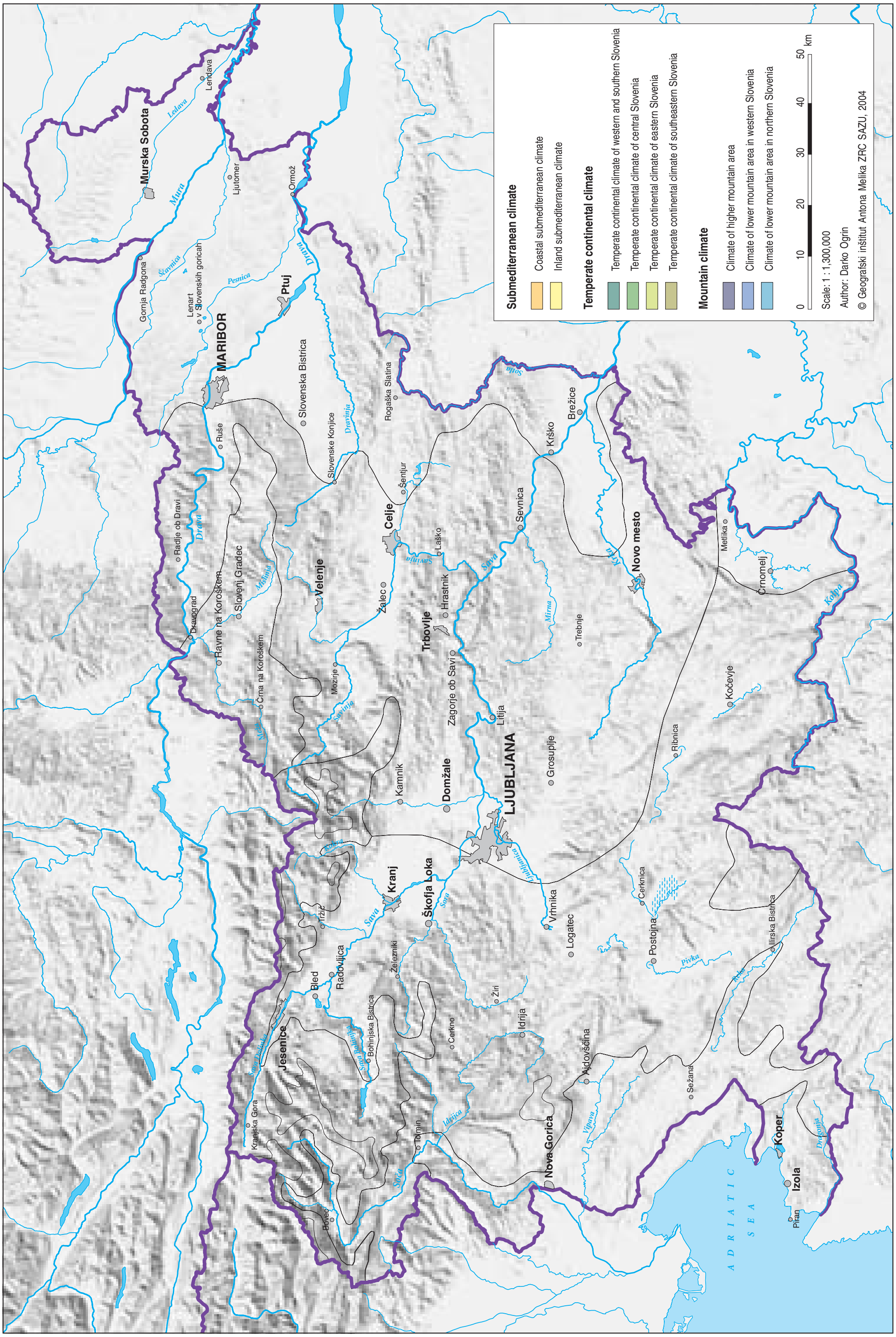
MODERN CLIMATE CHANGE IN SLOVENIA

Darko Ogrin

Basic characteristics of climate in Slovenia

From the perspective of climate units, Slovenia has a warm humid temperate climate like the rest of Europe, with the exception of its mountain regions. It is characteristic of this climate that the average temperatures of the coldest month do not drop below –3° C and that at least four months have an average temperature above 10° C. Relative to precipitation, all seasons receive approximately the same amount with no distinctive dry or wet periods. In a more detailed climate analysis, along with its position in temperate geographical latitudes close to cyclogenetic areas and the considerable height diversity of its surface, the transit character of Slovenia's territory between the Alps and the Dinaric mountains and the Mediterranean and the Pannonian Basin is important. Thus, in spite of its modest geographical size, three types of the climate meet and interweave on Slovene territory: alpine, Mediterranean, and continental (Ogrin 1996). Compared with the standard alpine, Mediterranean, and continental climates, the character of all three climates are not typical due to the intertwinement of their main features, and therefore we often add the prefix »sub-« (submediterranean, subcontinental, subalpine climate). The distinctive transit character of climate types in Slovenia and the variability of

Figure 1: The warm conditions in Slovene Istria, the Vipava Valley, and Goriška Brda in submediterranean Slovenia allow the growing of some southern cultures, including olive trees, a typically Mediterranean culture. Because of one of its northernmost locations in Europe, olive trees are threatened by frosts, which occur on average every twenty years (photography Darko Ogrin).


Submediterranean climate
Coastal submediterranean climate
Inland submediterranean climate
Temperate continental climate
Temperate continental climate of western and southern Slovenia
Temperate continental climate of central Slovenia
Temperate continental climate of eastern Slovenia
Temperate continental climate of southeastern Slovenia
Mountain climate
Climate of higher mountain area
Climate of lower mountain area in western Slovenia
Climate of lower mountain area in northern Slovenia
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Darko Ogrin
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◄ *Figure 2: Climate divisions in Slovenia.*

the climate make climate classification, establishing borders, and denomination difficult. In general, moving away from the Alps and the High Dinaric plateaus toward the east and northeast, continental climate features grow stronger; toward the south and southwest, Mediterranean features; and with increasing altitudes in the Alps and High Dinaric plateaus, the features of the alpine climate.

Characteristic of the **alpine climate** found in the Julian Alps, the Karavanke Mountains, the Kamniške-Savinjske Alps, the Pohorje mountain range, and the highest parts of the High Dinaric plateaus (Trnovski gozd, Snežnik) is that the average temperature of the coldest month is below –3° C and of the warmest, to the upper tree line (1,900 to 2,000 meters), above 10° C. The upper tree line is the dividing line between the climates of the high and the low mountain worlds. The latter also includes mountain valleys where summer temperatures are on the level of those in continental Slovenia, while due to pronounced temperature inversions, average winter temperatures are below –3° C. Also characteristic of the alpine climate is the least insolation in Slovenia (1,500 to 1,800 hours per year) and a very high level of precipitation (from 1,800 to more than 3,000 mm of precipitation per year).

To the south and southwest of the Alpine-Dinaric barrier, whose relief opens toward the Adriatic Sea, Slovenia has a **submediterranean climate**. Here are the most days with sun (up to 2,350 hours per year), the average temperatures of the coldest month are above the freezing point, and those of the warmest months are higher than 20° C. Due to the retentive action of the sea, temperatures in October are higher than those in April. The precipitation regime is submediterranean with high precipitation in the fall and at the end of spring or beginning of the summer and low precipitation in the winter and summer. The coastal climate variant immediately along the Bay of Trieste has the highest temperatures in Slovenia, and its hinterland variant has somewhat lower temperatures but more precipitation (from 1,200 to 1,600 mm per year).

A **temperate continental climate** is characteristic for the greater part of Slovenia, with the continental character of the climate intensifying toward the northeast. Average January temperatures are between 0° C and –3° C, while July temperatures are between 15° C and 20° C. Due to its location in the western part of the subalpine hills and in the area of the Dinaric barrier (which is why it is often called a »subalpine« climate), the temperate continental climate of southern and western Slovenia is characterized by large precipitation (1,300 to 2,000 mm) with a submediterranean precipitation regime. The temperate continental climate of central Slovenia has a mitigated continental precipitation regime (high precipitation in summer, low in winter) with less precipitation (1,000 to 1,300 mm). In the temperate continental (subpannonian) climate of eastern and southeastern Slovenia, October temperatures in the lowlands are equal to April temperatures while in the hills the April temperatures are higher, the continental precipitation regime is more pronounced, and the annual amount of precipitation (between 800 and 1,000 mm) is the lowest in Slovenia.

Trends of climate change in the last 150 years

In Slovenia and its immediate vicinity, there are two meteorological stations in Ljubljana and Trieste that have been operating without interruption for more than 150 years. The Trieste station began working in 1841, and the Ljubljana station in 1851. With the data from Ljubljana, we can illustrate the changes in the temperate continental climate of central Slovenia, and with the data from Trieste, the changes in the submediterranean climate of southwestern Slovenia. The locations and instrumentation of the two stations have changed numerous times throughout their history, and therefore the homogeneity of their data set is somewhat questionable. This is particularly true for Ljubljana, where after World War II the station was moved to the outskirts of the city, which by the end of the 20th century had become

part of the consolidated urban complex. Given that the data was never corrected, the data for Ljubljana, especially with regard to establishing the changes in the air temperature, represents a mix of the influence of the local urban climate and the general trends of climate change. The data set for Trieste, where the station was also moved several times but never out of the city limits, is more homogeneous. Furthermore, the temperature data was also corrected so that it corresponds to the measurements it would have had if the station had been operating the entire time at its current location in the center of the city not far from the sea.

Below we present the main trends in the changing of annual and seasonal temperatures and precipitation. The general course of temperatures between the two stations coincides, somewhat less for the course of precipitation, with the difference that the variability for Ljubljana is larger. At both stations, the temperatures indicate a general trend of increase, particularly the winter temperatures. In the last 150 years in Ljubljana, the average annual temperature rose by 1.4° (trend: 1 K/100 years), which is more than the standard deviation for annual temperatures, while in Trieste, which is under the climatic influence of the sea, only by 0.4° (trend: 0.2 K/100 years). In the last 150 years, winters in Ljubljana warmed by 2.5° (1.6 K/100 years), and in Trieste by 1.1° (0.7 K/100 years). In both cases, a pronounced warming trend in all seasons except fall has been evident in the last decade. A negative trend appears only in the summer temperatures of Trieste (–0.2 K/100 years), mostly due to the above-average warm summers at the beginning of the operation of this station and the relatively cooler summers in the second half of the 20th century until the 1980's. Since 1980, the summers have also begun to become warmer.

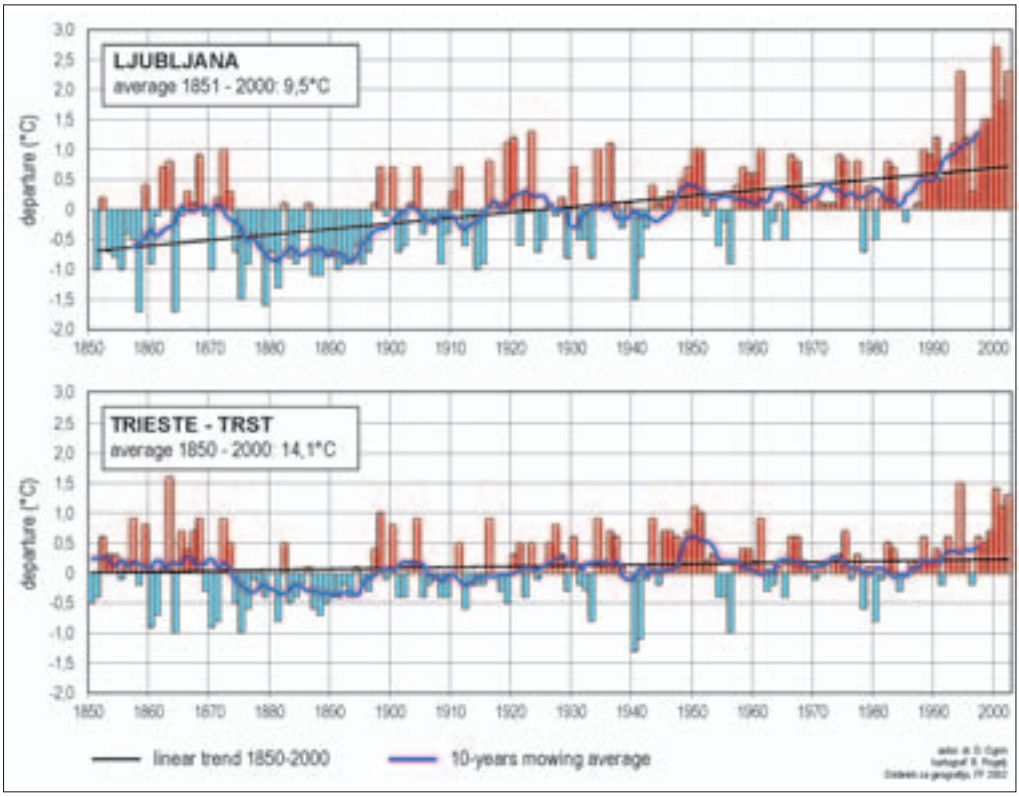

Figure 3: Average deviation and the trend of average annual temperatures in Ljubljana and Trieste between 1850 and 2002.

Figure 4: Free-growing palm in the center of Ljubljana. Will conditions for growing of thermophilic plants and cultures improve in central Slovenia due to the predicted climate change in the 21st century and the increasingly higher temperatures? (photography Darko Ogrin).

Average seasonal relative variability of precipitation at both stations is between 30% and 40%, and annually 17% (Ljubljana) or 20% (Trieste). At both stations, a lowering trend in the annual amount of precipitation is evident (Trieste: –80 mm/100 years; Ljubljana: –36 mm/100 years), largely due to the drop in the amount of precipitation in the fall (Ljubljana: –38 mm/100 years; Trieste: –44 mm/100 years). The drop in fall precipitation in the second half of the 20th century in Ljubljana brought about a change in the precipitation regime. The submediterranean regime with its primary climax in the fall was replaced by the subcontinental regime that has its climax of precipitation in the summer months. In Trieste, the summer and spring precipitation has also decreased along with the fall precipitation, while the winter precipitation shows no trend. In Ljubljana, spring precipitation has also decreased along with the fall precipitation, but summer and winter precipitation has increased slightly. It is interesting that in the last fifteen years, in Ljubljana and in Trieste, the fall precipitation has started to strengthen, which if this trend continues heralds another change of the precipitation regime in Ljubljana.

It is characteristic for the last fifteen years that temperatures in Slovenia have increased significantly. Average annual temperatures in all Slovene regions are 0.5° to 1° higher than the average temperatures between 1961 and 1990, the winters are 1° warmer, and the summers 1° to 1.5° warmer. The year 2000 was even the warmest since systematic measurements have been taken. Temperatures in the interior of Slovenia are becoming ever more similar to those in submediterranean Slovenia, where the warming trends are less pronounced. There have been no major changes in the quantity of precipitation, but the greater intensity of downpours and a lower number of days with fog and of days with snow blanket were found, which causes problems for lower-lying ski areas. Due to high summer temperatures and the irregularity of precipitation, considerable damage has been caused in the last decade by frequent droughts, which along submediterranean and subpannonian Slovenia, have also encompassed central Slovenia where they do not normally occur.

Although regional scenarios of future climate change are even less reliable than global ones, a forecast for Slovenia of the climate in the 21st century has been elaborated that considers the changes in the general circulation of atmosphere and previous trends in climate elements (Kajfež - Bogataj 2001). More reliable is the forecast of temperatures, which should increase by 1° ± 0.5° by 2025, and in the long term by 2° ± 1° by 2075. The forecast of precipitation is less reliable. The forecast also predicts more intensive warming in the cold half of the year, smaller daily temperature spans, fewer days with a snow blanket, more intensive precipitation and a changed precipitation regime, and more frequent and more intensive extreme weather events such as droughts, floods, and thunderstorms. It is expected that the negative consequences of climate change will nullify the positive effects linked to the prolongation of the vegetation period, the improvement of conditions for growing thermophilic plants, and the increase in the choice of plant cultures at higher sites.

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SOILS OF SLOVENIA

Blaž Repe

Slovenia is a small country covering a mere 20,273 m^2, but boasts great diversity in geology, relief, hydrological systems, and vegetation. This diversity is clearly reflected in its pedological characteristics.

Principal pedogenetic factors and processes in Slovenia

Because of its exceptional diversity and distinct variation over short distances, the bedrock is the most important pedogenetic factor in Slovenia. Through mechanical and chemical weathering, mineral elements enter the soil and have a decisive influence on its basic characteristics. A special stamp is given to Slovenia by the carbonate rock and the corresponding karst surfaces, which is why we often divide soils relative to their origin on carbonate or noncarbonate bedrock.

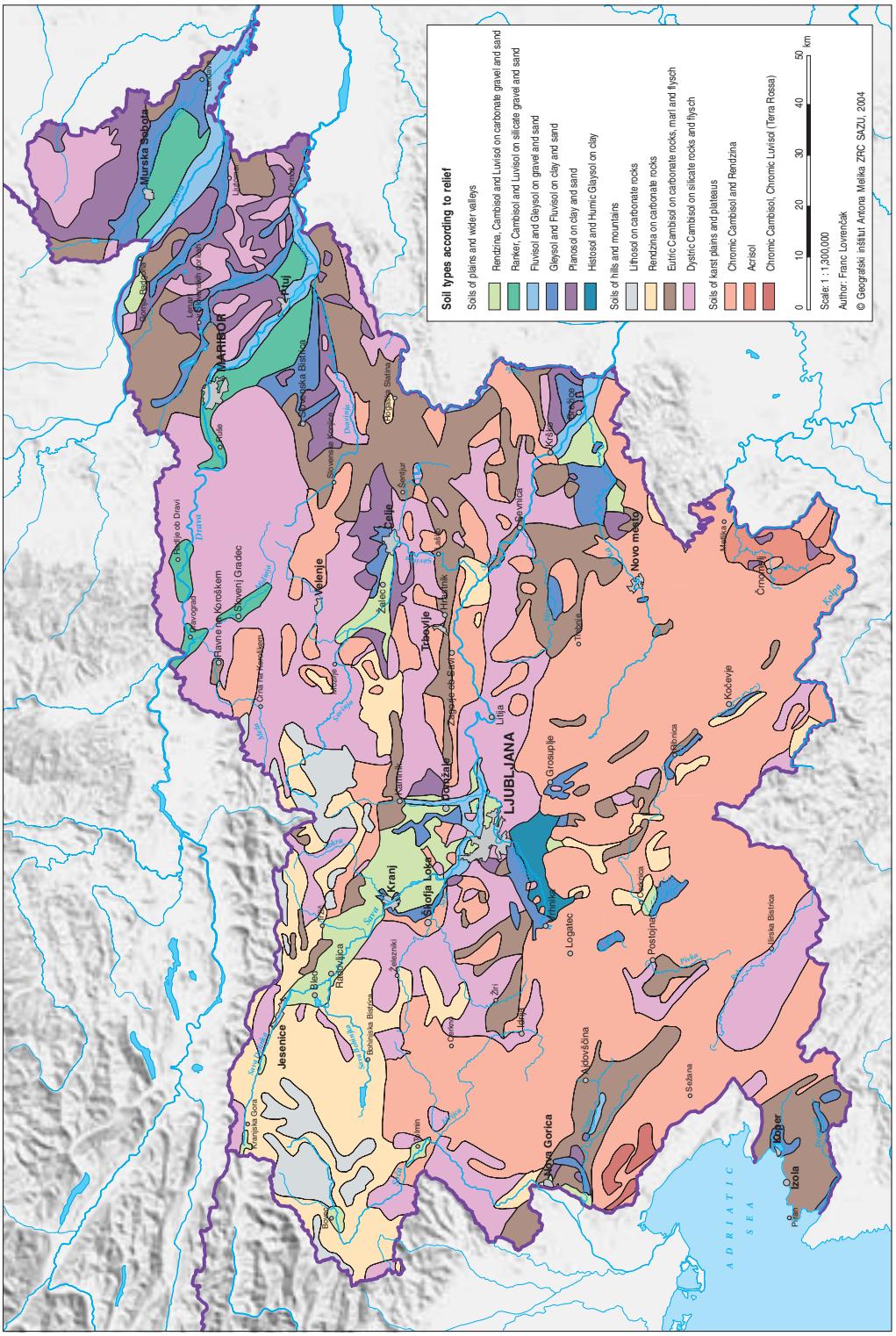
As a pedogenetic factor, relief has an indirect influence on the development of the soil with altitude, inclination, and exposition. Inclination substantially influences the distribution of the soil mass and water in the soil, while exposition and altitude influence the water regime and the temperature regime of the soil.

The climate above the ground directly influences the climate of the soil, i. e., its warmth and water-air regime. The climate of the soil is directly linked to the degree of disintegration of mineral components and particularly effects the disintegration and proportions of organic matter. However, from the viewpoint of pedogeography, regional climatic changes are minor because of Slovenia's small size, and we often treat the climate as a constant.

The importance of water as a pedogenetic factor is reflected in the fact that the basic division in the Slovene classification system distinguishes automorphic and hydromorphic soils. The influence of water is reflected in its movement through the soil profile. Vertical movement causes the shifting or washing away of tiny particles (nutrients, minerals of clays, and organic matter) that leads to the formation of horizons and therefore types of soil. The rising of water and the deposit of dissolved matter is a rare phenomenon in Slovenia because of its humid climate. Water also moves through the soil horizontally and influences the shifting of soil in the area (erosion, denudation, solifluction …). And finally, lack of movement or stagnation of water in the soil leads to alternating oxidation and reduction processes and thus to the formation of gley, pseudogley, and peat soils.

The living world (plants and animals) constantly changes the soil mechanically and chemically and together with the decomposition of dead matter contributes to the influx of organic and nutrient substances. This ensures the preservation of the basic quality of the soil, its fertility. Dead organic matter thus influences a whole range of properties of the soil (structure, water-air regime, accessibility to nutrients …). Because of the large proportion of forest in Slovenia, the influx of organic matter into natural soils is practically permanently guaranteed.

Today, man represents one of the most important pedogenetic factors. From the pedogenesis point of view, the changes that man causes are momentary and began with Neolithic cultivation. Man can have a positive influence on the soil by improving the fertility, but his negative influence on the soil is of much greater concern, primarily anthropogenetically accelerated water and wind erosion, chemical (pollution, salinization), and mechanical (soil compaction) degradation, and the increasingly frequent irreversible use of soil as a consequence of urbanization.


Soil types according to relief
Soils of plains and wider valleys
Rendzina, Cambisol and Luvisol on carbonate gravel and sand
Ranker, Cambisol and Luvisol on silicate gravel and sand
Fluvisol and Gleysol on gravel and sand
Gleysol and Fluvisol on clay and sand
Planosol on clay and sand
Histosol and Humic Gleysol on clay
Soils of hills and mountains
Lithosol on carbonate rocks
Rendzina on carbonate rocks
Eutric Cambisol on carbonate rocks, marl and flysch
Dystric Cambisol on silicate rocks and flysch
Soils of karst plains and plateaus
Chromic Cambisol and Rendzina
Acrisol
Chromic Cambisol, Chromic Luvisol (Terra Rossa)
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Franc Lovrenčak
© Geografski inštitut Antona Melika ZRC SAZU, 2004
Murska Sobota
MARIBOR
Ptuj
Slovenska Bistrica
Slovenske Konjice
Velenje
Celje
Trbovlje
Hrastnik
Zagorje ob Savi
Litija
Novo mesto
Črnomelj
Metlika
Kočevje
LJUBLJANA
Domžale
Kamnik
Grosuplje
Kranj
Škofja Loka
Tržič
Logatec
Postojna
Jesenice
Bled
Radovljica
Železniki
Idrija
Cerkno
Vipava
Nova Gorica
Ajdovščina
Sežana
Ilirska Bistrica
Koper
Izola
Piran
ADRIATIC SEA

◄ *Figure 1: Distribution of soils in Slovenia.*

Due to its varied relief, great inclinations, and abundance of precipitation, Slovenia is potentially quite threatened by water erosion, but for the moment it is safe because of the high proportion of forest and the abandonment of farming on unsuitable land. The pollution of the soil is mostly the consequence of industrial and urban development, and in some places pollution exceeds the allowed limits several times over. This problem is of major concern in the valleys and basins, which are unfortunately the only areas suitable for intensive agriculture and settlement and are also areas of groundwater supplies. The greatest problem, however, is the fact that the most fertile soils are located in areas of interest for urbanization, industrialization, and the construction of infrastructure. Because Slovenia has little surface area suitable for agriculture, its must guard its soils as a strategic asset, especially as we lost over 17,000 hectares of fertile soil between 1958 and 1988 (*Medmrežje 2*), and a further 4,078 hectares between 1993 and 1997 (*Okolje v Sloveniji* 2002, 2003).

As a pedogenetic factor, time is treated as the period in which the soil is formed. From the geological point of view, this process is exceptionally short, and from the human point of view, very long. Due to extremely dynamic factors and processes, the soils in Slovenia are relatively young since the majority are younger than 10,000 years (Prus 2002).

To have a complete picture of the formation of soils in Slovenia, it is necessary in addition to knowing pedogenetic factors to have a good knowledge of pedogenetic processes. Among the most important are the weathering of the bedrock and the formation of clay minerals, leaching, braunification, acidification, and gleying and pseudgleying.

Figure 2: The arial view on Alpine and subalpine Slovenia (photography Jurij Senegačnik).

Alpine and subalpine Slovenia

Decisive factors for the formation of the soil in the highest parts of Slovenia are the geological foundation and the relief, primarily the inclination and the altitude. In the broadest sense, we divide soils into those formed on carbonate bedrock and those on noncarbonate bedrock. On sloping surfaces, the development of the soil goes from poorly developed regolith on scree and extreme inclinations through young and often shallow rendzina on carbonate rock or ranker on a silicate base. Older forms are brown forrest soils and distric brown soils on lesser inclinations where signs of leaching may already appear. On flat plateaus (Jelovica, Pokljuka) with abundant precipitation where the runoff is hindered, gleyed peat soils were also formed. In the valleys and basins of central Slovenia (Ljubljana basin, Celje basin) fertile eutric brown soils developed on gravel deposits and leveled relief and on older terraces are often leached and therefore acid. Immediately beside the rivers spread belts of brown fluvisols soils.

According to the international FAO classification, various forms of leptosols (lithic, umbric, rendzic), cambisols, luvisols, fluvisols, and histosols are found in alpine and subalpine Slovenia.

Submediterranean Slovenia

A distinctive duality in the bedrock is characteristic here due to the alternating hard carbonate rock (limestone and dolomite) and the softer flysch. On the hard carbonate bedrock, a mosaic soils is characteristic where the types of the soil and their thickness alternate over exceptionally short distances. The alternating materials are mainly shallow rendzina, brown forrest soil, and in the Kras region as a special form, a distinctly red jerina or jerovica (previously called »terra rossa« but according to the international FAO classification, this is chromic cambisol) that can exceed depths of two meters in individual pockets. The experts do not entirely agree about the origin of the latter, whether it is still forming

Table 1: Occurrence of soils in Slovenia.

Type of soil	Proportion [%]
Acrisols	0.7
Leached soils	1.1
Distric brown soils on Ice Age river rubble	2.2
Distric brown soils on noncarbonate flysch	3.6
Distric brown soils on various silicate rock	20.6
Eutric brown soils on rocks with alkaline or neutral reaction	6.4
Eutric brown soils on sandstone and flysch	7.5
Eutric brown soils on Ice Age river rubble	2.1
Regolith and rendzina on limestone and dolomite	2.6
Rendzina on limestone and dolomite and on Ice-Age river rubble	9.1
Brown forrest soils, typical and leached	32.2
Jerina (Chromic cambisol)	0.4
Riverine soils	2.2
Pseudogleyed soils, distric	5.0
Pseudogleyed soils, eutric	0.2
Gleyed soils	3.4
Peat soils	0.5

today in warmer and dryer submediterranean Slovenia or if jerina is the relict remains of a warmer period in the past. The typical red colour is the result of the presence of hematite. Due to the alternating mineral structure of flysch, even the soils on flysch are not uniform (Koper littoral region, Brkini, Goriška Brda). Typical is the undeveloped form regosol, but otherwise various forms of rendzina and distric and eutric brown soils occur, creating good conditions for vineyards and orchards. The latter soils rank among the most fertile soils of this part of Slovenia (Vipava Valley), but on plains they are often pseudogleyed or gleyed and thus become marshy.

According to the international FAO classification, various types of regosols, leptosols, cambisols and eutric fluvisols are found in submediterranean Slovenia.

Dinaric Slovenia

Soils in the karst Dinaric Slovenia are similar to those in the Kras region described above. Formations on limestone and dolomite distinctly prevail, alternating at short distances (rendzina and brown forrest soils). However, pockets of soil between intervening rock outcroppings are even more distinctive here. The cultivation on such surfaces is very difficult because the rock must be cleared. The undulating and very irregular relief presents a further obstacle. The thicker layers of soil were created artificially by removing rocks from the surface and adding soil at the bottom of dolines. The rocks were used to build the typical stone walls that form property boundaries and protect the soil from wind erosion.

Flat relief is found at the bottom of larger uvalas and karst poljes, but the fine silt and clay deposits hinder the flow of water through the soil. Floods are frequent, and therefore gley and pseudogley are to a large degree suitable only for meadows. The absence of surface waters due to the karst surface also means a relatively small proportion of riverine soils, although especially in Dolenjska they represent important field surfaces.

A special type of soil developed in Bela Krajina **[Do not understand the problem?]** where thick layers of insoluble residues gathered on limestone plateau. The unique anthropogenic land use in the form of collecting and mowing of fern for **strewing** litter almost completely stopped the influx of organic matter and nutrients and greatly impoverished the soil. In spite of the carbonate bedrock, heavily acidic and leached acrid soils were formed with a typical secondary forest association of birch and eagle fern (*Pteridio aquilinum*).

According to the standards of the international FAO classification, various forms of leptosols, cambisols, fluvisols, gleysols, luvisols, and acrisols are found in Dinaric Slovenia.

Subpannonian Slovenia

A smaller presence of carbonate rock is characteristic of northeastern Slovenia, and therefore soils typical of noncarbonate bedrock, ranker and distric brown soils, dominate on sloping relief. Along with the bedrock and the relief, water is also a decisive pedogenetic factor. Due to the abundance of surface waters, the high level of the water table, and the relatively flat surface, the most riverine, gleyed, and pseudogleyed soils in Slovenia are found here and have a predominantly distric character. The great part of these surfaces is also marshy or has been subject to drainage and land improvements in order to acquire field surfaces.

A substantial proportion of the region is covered by Tertiary flysch hills where the eutric soils make intensive winegrowing possible.

In spite of the naturally poorer fertility of the soil, the northeastern part of the country became the most important agricultural area of Slovenia because of its flat surface.

Figure 3: Subpannonian Slovenia (photography Luka Pintar).

According to the international FAO classification, various forms of fluvisols, regosols, leptosols, cambisols, planosols, and gleysols are found in subpannonian Slovenia.

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VEGETATION OF SLOVENIA

Blaž Repe

The natural vegetation in Slovenia is forest, which is the primary vegetation on more than nine tenths of our territory. As with the majority of other features, Slovenia is also distinctly transitional in terms of its vegetation, which is therefore correspondingly diverse. Because Slovenia lies at the contact of four major landscape units, Wraber (1960) divided Slovenia into six phytogeographical areas based on vegetation associations: Alpine, Subalpine, Dinaric, Subdinaric, Submediterranean, and Subpannonian. In 1987, Zupančič and his colleagues laid the foundations for a new division of Slovenia into three regions and four provinces:

- Alpine-High Nordic region,
  - Alpine province,
- Euro-Siberian-North American region,
  - Central European province,
  - Illyrian province,
- Mediterranean region,
  - Adriatic province.

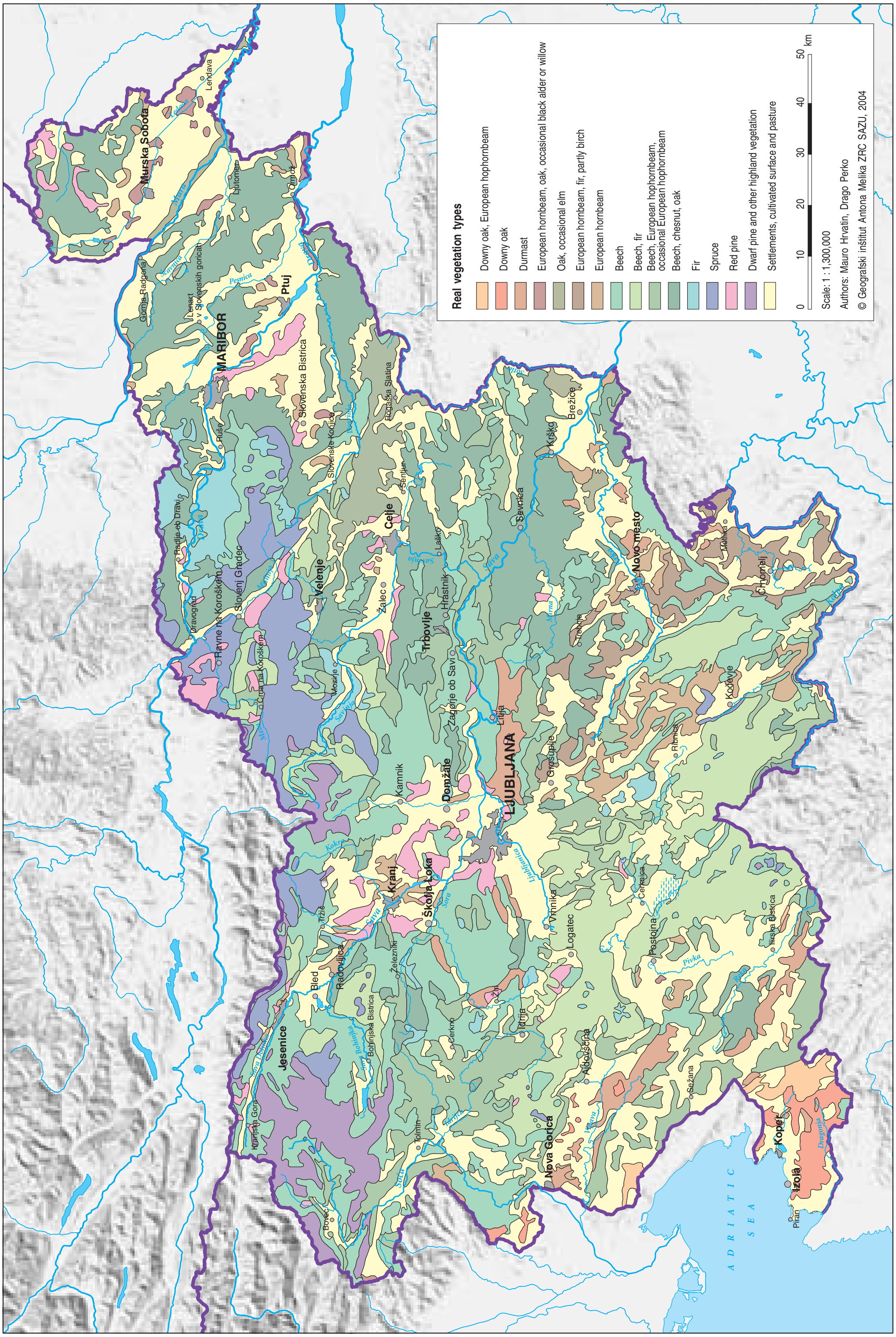
Habitat factors

Basically, all the physiogeographical elements contribute to the diversity of the forest vegetation cover but first place goes to climate, which dictates the main zonation of the vegetation cover. The interweaving of alpine, continental, and Mediterranean climate influences is of special importance since it influences the distribution and quantity of precipitation, the course of temperatures and with it the length of the vegetation period, potential evapotranspiration, etc.

Relief, which influences vegetation according to altitude, position, inclination, and insolation, is directly connected with the climate, primarily the mezzoclimate and microclimate. Thus, altitude vegetation belts often formed in hilly and mountainous areas. Because of the short vegetation period, low temperatures, the long and abundant snow cover, and the constant and strong winds, the forests end in a distinct upper tree line. It is lower in Dinaric Slovenia, where it is composed of beech stands (*Fagus sylvatica*) at altitudes up to 1,600 meters but is considerably higher in the alpine areas where spruce and larch (*Picea abies* and *Larix decidua*) forests grow to the altitude of 1,900 meters. Dwarf pine (*Pinus mugo*) grows above the upper forest limit, followed by a belt of mountain grassland. Microclimatic conditions, especially in the dolines and collapsed dolines of the Dinaric area, are fostered by the occurrence of temperature inversions, and corresponding vegetation inversions appear where vegetation belts follow one another in the reverse order.

Horizontal and vertical zonation is interrupted by geological, pedological, and water conditions. The latter influence the vegetation primarily in connection with the formation of the relief and with the bedrock where the water flow is hindered and the groundwater is close to the surface. Such conditions enable the growth of various higrophytic and hydrophytic (marsh and moor) plants, mostly meadow plant associations.

The soils directly reflect the geological parent material and foster the formation of azonal edaphic associations that form mainly due to variations in the texture and soil reaction, the supply of nutrients, and the water-air conditions.


Real vegetation types
Downy oak, European hophornbeam
Downy oak
Durmast
European hornbeam, oak, occasional black alder or willow
Oak, occasional elm
European hornbeam, fir, partly birch
European hornbeam
Beech
Beech, fir
Beech, European hophornbeam, occasional European hophornbeam
Beech, chesnut, oak
Fir
Spruce
Red pine
Dwarf pine and other highland vegetation
Settlements, cultivated surface and pasture
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Authors: Mauro Hrvatin, Drago Perko
© Geografski inštitut Antona Melika ZRC SAZU, 2004
Murska Sobota
Lendava
Ljutomer
Ormož
Gornja Radgona
Lenart v Slovenskih goricah
Ptuj
MARIBOR
Slovenska Bistrica
Rogaška Slatina
Slovenske Konjice
Ruše
Šentjur
Radlje ob Dravi
Dravograd
Ravne na Koroškem
Slovenj Gradec
Velenje
Celje
Žalec
Laško
Sevnica
Krško
Brežice
Hrastnik
Trbovlje
Zagorje ob Savi
Litija
Mozirje
Črna na Koroškem
Novo mesto
Trebnje
Metlika
Črnomelj
Kočevje
Ribnica
Grosuplje
LJUBLJANA
Domžale
Kamnik
Kranj
Škofja Loka
Tržič
Radovljica
Bled
Jesenice
Kranjska Gora
Železniki
Bohinjska Bistrica
Vrhnika
Logatec
Cerknica
Postojna
Ilirska Bistrica
Idrija
Žiri
Cerkno
Ajdovščina
Sežana
Tolmin
Bovec
Nova Gorica
Koper
Izola
Piran
ADRIATIC SEA

Today, man is the greatest transformer of forest in Slovenia. Since the distant past, he has exploited and cut down forests for his needs, clearing forest areas and converting them to meadows and pastures. He introduced rapidly growing and economically interesting species, particularly the Norway spruce (*Picea abies*), thus reducing biotic diversity and greatly increasing the threat to forests. Through drainage and the lowering of the water table, some hydrophytic stands have completely disappeared (e. g., forests of black alder, *Alnus glutinosa*, in Prekmurje). Through characteristic and constant exploitation, man degraded primary plant associations and completely changed the appearance of the landscape (litter forests of birch and eagle fern, *Betula pendula* and *Pteridium aquilinum*, in Bela Krajina) or deliberately created completely new associations (forests of black pine, *Pinus nigra*, in Kras). Due to the pollution of the air, water, and soil, poisonous materials accumulate in plants and cause disturbances in physiological processes, hinder their growth, or even cause their destruction (drying of silver fir, *Abies alba*, in the Dinaric area).

Types of natural vegetation in Slovenia

Slovenia is a natural habitat for over sixty forest associations, in which grow 45% deciduous trees and 55% conifers. Three quarters of these habitats are overgrown with beech forests (*Fagetum*) with beech (*Fagus sylvatica*) as Slovenia's most frequent naturally occurring tree (32% of the wood stock). In former beech habitats, man largely introduced Norway spruce (*Picea abies*), which today is the most numerous tree in Slovenia (33% of the wood stock).

Table 1: Most extensive tree associations in Slovenia.

Forest association	Surface area [ha]
Castaneo sativae-Fagetum	321,979
Omphalodo-Fagetum	146,608
Ostryo-Fagetum	129,231
Blechno-Fagetum	91,057
Lamio orvalae-Fagetum	82,653
Anemono trifoliate-Fagetum	64,857
Hacquetio epipactidis-Fagetum	60,326
Ostryo carpinifoliae-Quercetum pubescentis	50,361
Avenello flexuosae-Piceetum	42,879
Galio rotundifolii-Abietetum albae	36,505
Abio albe-Carpinetum betuli	36,372
Seslerio autumnalis-Fagetum	31,659
Ranunculo platanifoliae-Fagetum	30,296
Homogyno sylvestris-Fagetum	25,963
Vaccinio myrtilli-Pinetum sylvestris	22,883

Source: Marinček, Čarni 2002.

Various forms of thermophilic submediterranean forests grow in the Primorska area, mostly consisting of downy and sessile oak (*Quercus pubescens*, *Quercus petraea*) and hop hornbeam (*Ostrya*

◄ *Figure 1: Distribution of vegetation in Slovenia.*

*Figure 2: The beech forests (*Fagetum*) are the most frequent (photography Luka Pintar).*

carpinifolia) and flowering ash (*Fraxinus ornus*). Autumn moor grass (*Sesleria autumnalis*) dominates the herbaceous layer. The bottoms of the valleys and basins in central Slovenia are overgrown with lowland forests of sessile oak and hornbeam (*Carpinus betulus*), which to a large degree have been cleared since these are the main areas of settlement and agriculture. Flood plain forests of English oak (*Quercus robur*), hornbeam, and black alder (*Alnus glutinosa*) are characteristic of the plains of northeastern Slovenia.

In the high mountains, the most frequent associations are those with Norway spruce (*Picea abies*), silver fir (*Abies alba*), European larch (*Larix decidua*), and beech, which transform into associations with dwarf pine (*Pinus mugo*) above the upper tree line.

In the rest of Slovenia, beech forests in various forms are absolutely dominant. On non-carbonate bedrock, mostly in central and northeastern Slovenia, these are acidophilic beech groves with deer fern (*Blechnum spicant*) and sweet chestnut (*Castanea sativa*), often mixed with Scotch pine (*Pinus sylvestris*). On carbonate bedrock, the lowest lying are submontane beech forests with *Hacquetia epipactis*, *Lamium orvala* or hop hornbeam (*Ostrya carpinifolia*). In the montane belt of the subalpine area, they transform into an association with the *Anemone trifolia* that often reaches to the upper tree line. In the Dinaric karst region of Slovenia, the belt to the upper tree line is formed by the largest areas of unbroken forest in Slovenia, the Dinaric fir-beech forests (*Abieti-fagetum*) or the association of beech with *Omphalodes verna*.

Changes in the proportion of forest in Slovenia

Before the appearance of man, forests covered more than 90% of the surface of Slovenia. The only exceptions were distinctly wet habitats and the mountains above the upper tree line.

Figure 3: A typical mountain forest landscape (photography Jurij Senegačnik).

From the first human settlement to the beginning of the 20th century, the proportion of forest in the territory of Slovenia fell continuously. The main reasons were primarily the spread of agriculture and stock farming, as well as the cutting of forests for various needs (heating, construction, industry, etc.). The lowest proportion, recorded in the late 19th century (ZGS 2002), was 36%, which is still high compared with the rest of Europe and points to the distinctly protective function of the forest.

With the start of the Industrial Revolution and even more after World War II, agriculture began to wane heavily and farmland was abandoned, at first the less favourable and later even the best farmland. In spite of attempts to expand agricultural areas through land improvement and the drainage of wetlands, the proportion of forest began to rise steeply.

Table 2: Changes in the proportion of forest in Slovenia after World War II.

Year	Forest [km^2]*	Year	Forest [km^2]*
1875	36.4	1990	52.8
1947	43.4	1995	54.2
1953	42.0	1998	54.8
1956	43.7	1999	55.0
1958	45.3	2000	55.9
1961	46.5	2001	56.4
1980	51.6	2002	56.7

* – not including overgrowing surfaces
Source: *Statistical Yearbook 2003.*

Today, forests cover more than 60% of the country, which ranks Slovenia among the most heavily forested countries in Europe (among European countries, only Sweden and Finland have more forest), and the proportion is still increasing.

Table 3: Proportion of total surface area (Slovenia covers 20,273 km^2) according to categories of ground cover [%].

Forest together with overgrowing surfaces	Agricultural	Open	Waters	Built up	Transportation infrastructure
63.3	30.5	1.6	0.7	2.8	1.1

Meadows and pastures are disappearing, cultural landscapes are disappearing, and many areas of Slovenia are threatened with the loss of their traditional appearance. Furthermore, the unchecked spread of cities and the transportation infrastructure threatens to eliminate the few remaining green oases at the bottoms of valleys and basins that at least to some extent help improve the quality of life of the urban population.

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BIODIVERSITY IN SLOVENIA

Ana Vovk Korže

Slovenia occupies less than 0.004% of the entire world's surface and 0.014% of its land. Its numeric share of the world's population is slightly higher. However, Slovenia is also home to more than more than one percent of al known species of living beings on earth and more than 2% of continental (land and freshwater) species. This means that every hundredth known species of all current living beings or every fiftieth known continental species lives in Slovenia. Such a high number ranks Slovenia among the naturally richest areas of Europe and even the world (Mršić 1997, p. 9). This richness is the consequence of the contact between the Mediterranean, Alpine, Pannonian, and Dinaric macroregions and directly reflects these biogeographical regions. Human activity has also contributed to the biodiversity in the territory of today's Slovenia, the result of the interweaving of the Slavic, Germanic, and Romance cultures. Due to its modest number of natural resources and exceptionally divers natural characteristics, Slovenia's biotic diversity has been well preserved.

Table 1: Natural characteristics of Slovenia (Part 2: State of Biodiversity, p. 13).

Regional elements	Characteristics
Geological foundation	Junction of four geotectonic units (Eastern Alps, Dinaric Alps, Pannonian Basin, Adriatic-Apulian foothills) and diverse geological foundation
Biogeographical regions	The Alps (30%), Dinaric Alps (30%), Mediterranean Basin (10%), and Pannonian plain (30%) on an area of 20,273 km^2 give Slovenia a transitional character.
Relief	Diverse relief; altitudes from 0 to 2,864 meters; $^1/_6$ of the territory covered by Quaternary sediments; about 44% of the bedrock is carbonate, largely karstified (more than 7,000 registered caves).
Hydrological conditions	Two river systems: $^2/_3$ of the water flows to the Black Sea, $^1/_3$ to the Mediterranean; five watershed: the Soča, Sava, Drava, and Mura rivers and the Slovene littoral; relatively large karst area without surface watercourses.
Land use	61% of the surface is covered by forest; 36% of the surface is farmland
Flora	About 3,200 higher plants (ferns and flowering plants); 60 endemic taxa, 22 of which with exclusive or predominant distribution in Slovenia
Fauna	13,000 to 15,000 species; about 4,000 endemic animal species (mostly subterranean animals)

Regrettably, in recent decades the development of industry, agriculture, and the transportation infrastructure and urbanization have contributed substantially to the pollution of surface and underground waters, soil, and air as well as to the destruction of individual natural areas. The consequence of pollution, particularly the destruction of parts of environment, is decreasing biotic diversity at the ecosystem, species, and genetic levels, which causes a decrease in landscape diversity. Relative to past and present economic development, a study of the condition of natural and semi-natural habitats revealed that the most threatened habitat types in Slovenia are the littoral, shoreline, and maritime habitat types, running waters and their corresponding wetlands, dry grasslands, and subterranean habitats with an emphasis on subterranean fauna (Part 2: State of Biodiversity, p. 13).

Figure 1: The moor on Pohorje (photography Matevž Lenarčič).

Forests are the dominant original (natural) ecosystems in Slovenia, and among non-forest ecosystems are areas above the tree line, the sea and its shoreline, and subterranean ecosystems. Slovenia is a country of forests as they cover 61% of the surface (Statistics Yearbook of Slovenia 2003) and, regarding forest cover, ranks in third place in Europe. In Slovenia's large complexes of unbroken forest, species have been preserved that no longer have adequate living space for their survival in many other places (for example, bear, wolf, lynx, wild boar).

The varied and mosaic composition of Slovenia's regions is the consequence of natural assets, traditional settlement patterns, and the recent intensive urbanization and construction of infrastructure. According to Ilešič's geographical regionalization of 1979, Slovenia is divided on the basis of climate and geological conditions into five basic regions: alpine, subalpine, subpannonian, karst, and littoral. Specific flora developed in each of these regions.

The alpine region encompasses northwestern Slovenia and its highest mountain groups: the Julian Alps, Karavanke Mountains, and Kamniške-Savinjske Alps. Due to the prevalence of carbonate rock and the younger mountain-forming processes, a very irregular relief with large altitude differences between the highest Slovene peaks and the glacial valleys is characteristic of the region. The vegetation adapted to the alpine climate. In the valleys, there are rare and partly preserved shrubby meadows. With increasing altitude, deciduous forests are replaced by spruce forests and then a belt of dwarf pine with larch and high-mountain grass. Settlements are rare in the Alps with villages clustered on high-lying sun-lit terraces and isolated farms higher up. For raising cattle, forests were cleared to make pastures.

The subalpine area stretches from the border with Italy along the Nadiža River across the western subalpine hills, the central Slovene plain with Ljubljana, the eastern subalpine hills along the Sava River to the Pohorje and Kozjak mountains along the Austrian border. The area is composed of limestone, dolomite, and igneous and metamorphous rock, and there are extensive gravel deposits in the Ljubljana and Celje basins. Due to the diverse geological composition, the surface is irregular. Rounded hills

of softer rock alternate with steep rocky peaks of limestone and dolomite that reach or exceed 1,000 meters above sea level. Beech forests in associations with spruce, hornbeam, and characteristic white wood rush and wood anemone cover extensive surfaces. The Cerkljansko, Idrija, and Škofja Loka hills are steeper, while in the eastern part the surface is more gently sloping with individual higher peaks (Paški Kozjak, Kum, Lisca, Boč) of limestone where characteristic calciphilic plants grow on rendzina. For the needs of agriculture and settlement on the plains, the wetlands along periodically flooding streams were drained.

Subpannonian Slovenia encompasses all of eastern Slovenia, the region with the Posavsko-Obsoteljsko and Krško hills, Krško-Brežiško polje, and the Krka River valley with its peripheral areas. The plains are composed of clay sediments and gravel alluvia on which riverine soils developed and in some places moist pseudogley. There are cultivated fields on hydromeliorated areas and meadows elsewhere. This part of Slovenia is known for its vast plains and its hills where grapevines grow well due to the temperate continental climate. Forests cover steep and shady sites, and in recent decades, the proportion of forest has increased. There are flood groves along the Mura River of major ornithological significance, and the reservoirs built to retain floodwaters along the Ledava, Pesnica, and Drava rivers perform a similar role.

Along with central and southern Slovenia, the karst regions of Slovenia's interior also encompass the Gorjanci mountain range to the east and Trnovski gozd and Banjšica ridges in the west. The relief is characteristically karstic with all the variety of karst phenomena from karst poljes and disappearing rivers to dolines and caves. A continental climate is connected with average altitudes of around 500 meters. Preserved fir-beech forests and karst poljes are characteristic of the region.

Littoral Slovenia encompasses southwestern Slovenia from the Adriatic Sea to Matarsko podolje, the Vipava Valley, Kras, and the Soča Valley to Most na Soči and has a submediterranean climate. The uniformity of the region is reflected in its littoral vegetation and ecosystems from natural karst vege-

Figure 2: The Sečovlje salt flats (photography Milan Orožen Adamič).

tation to reforested areas of black pine. Truck farming, vineyards, orchards, and olive groves have changed the region to a great extent.

Moors are another special biotic feature. High and transitional moors are found on the southeastern border of the spread of European moors. They stretch from the Julian Alps across Pokljuka and Jelovica to Pohorje. The total area of all fourteen of Slovenia's remaining high moors is barely one hundred hectares, and they are considered under threat.

Low moors on plains and hills are more frequent and interesting from the physiognomical, vegetation, and ecological points of view. They are surrounded by meadows or farmland, and therefore there is a constant potential threat of drainage. Hydromeliorations, reservoirs, and the consolidation of farmland have already completely destroyed them in places.

The Sečovlje salt flats and the Škocjan Caves are already on the Ramsar List of Wetlands of International Importance (UNESCO), and areas with exceptional biotic diversity that match the criteria for inclusion on this list include the flood plain of the Mura River with its unique oak groves, oxbow lakes, and marshy meadows, the Drava River from Maribor to Središče ob Dravi; the primeval Krakovski gozd forest, the wetlands along the lower Sava River, the Ljubljansko Barje moor, the area of the karst Ljubljanica river with its low moors, and the gravel beds of the Soča River.

Domestic animals are an ancient cultural asset of mankind. In the centuries of development after domestication, subspecies evolved from geographically isolated populations and within them types adapted to the conditions of a specific environment and climate. Slovenia's autochthonous domestic animals include the Lipizzaner horse, the **cow**, Jezersko-Solčavska sheep, the Štajerska chicken, the Carniola bee, and several others.

Urban ecosystems give a visual appearance to populated areas and occur in many forms such as garden allotments, parks, gardens, green belts, river embankments, fishponds, lakes, and suburban forests. Open green areas in cities, which are constantly dwindling, are a refuge for specific plant and animal species and have an important function in urban ecology.

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NATURAL DISASTERS

Milan Orožen Adamič

Natural disasters pay us unwelcome visits year after year: earthquakes, floods, hailstorms, frosts, droughts, or landslides. Prevention and protection from them is a very important question for development and the future because even if there is no major disaster, they consume two to three percent of Slovenia's annual GDP every year.

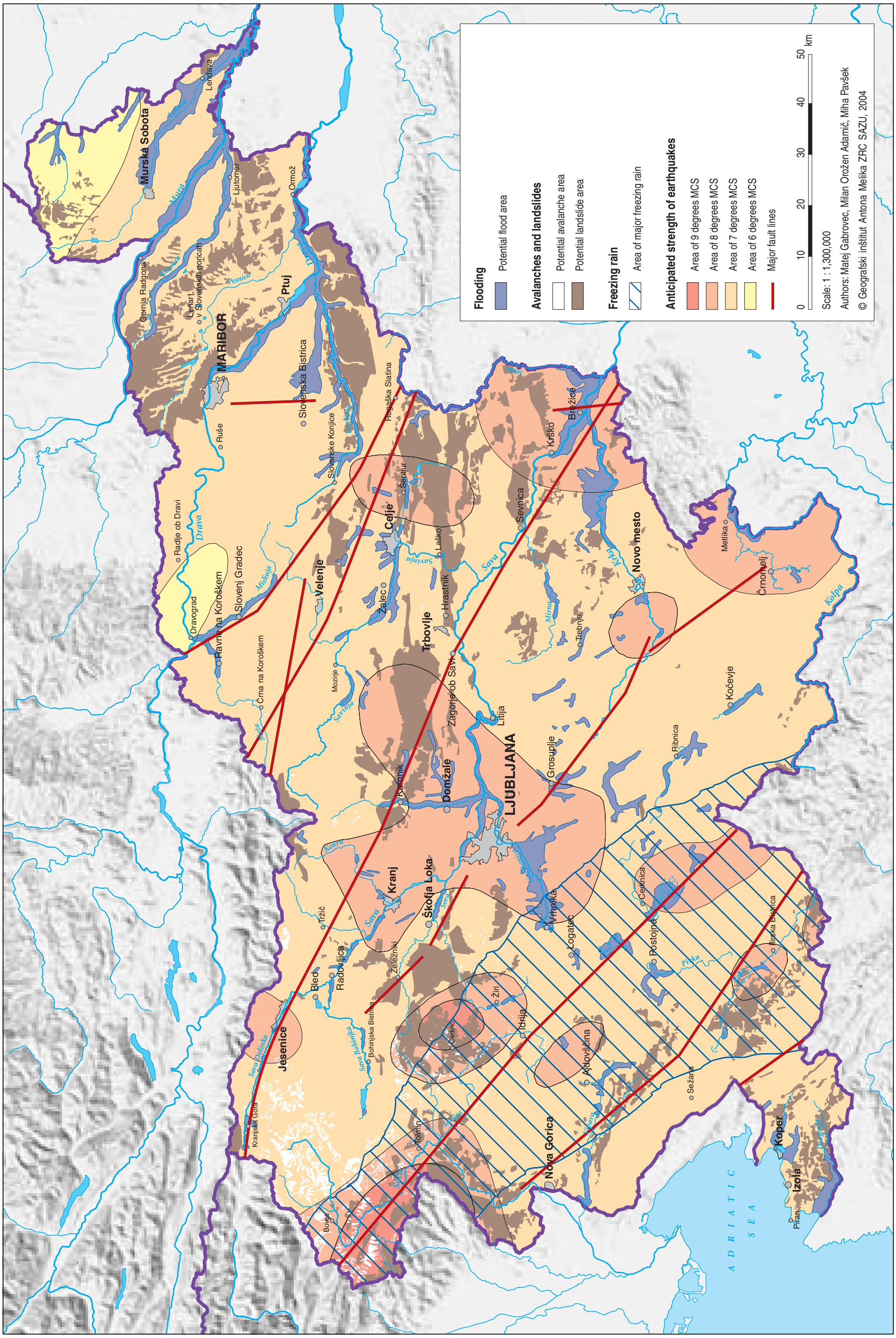
Because Slovenia is a country of great regional diversity, we find very diverse natural phenomena and a broad palette of natural disasters. There is no reason to think that natural disasters occur more frequently today than in the past, but we are undoubtedly more sensitive or vulnerable to their consequences. The Ljubljansko Barje moor and its margins started to become more intensely settled only in the middle of the last century, and the rise in the number of people employed in non-agricultural sectors greatly increased the population density in the valleys.

It is characteristic that Slovenia suffers relatively few casualties in natural disasters, but the material damage they cause is great. Most deaths occur in avalanches (37%), followed by earthquakes (30%), lightning (13%), floods (12%), storms (6%), and other natural disasters (2%). It is estimated that an exceptional earthquake in the area of Ljubljana could result in 1,000 or more casualties. It has been over one hundred years since the last major earthquake shook Ljubljana and its surrounding area in 1895. How bad the consequences would be today from a possibly even stronger earthquake depends on how prepared we are for it. The earthquake will be the only impartial evaluator of our anti-earthquake protection measures and earthquake-safe construction.

The most threatened areas in Slovenia, where earthquakes up to 9° MCS can be expected (500-year recurrent period) are the Tolmin and Idrija areas, which encompass 1.79% of the surface of Slovenia where 0.54% of Slovenia's population lives. Part of the Ljubljana area, which otherwise lies in the 8° MCS zone, ranks in the 9° MCS zone relative to its microseismic regionalization. Areas of 8° MCS, where substantial earthquakes effects can still be expected, encompass 21.37% of Slovenia where 32.56% of the population lives. (The MCS scale, which is still a part of Slovenia's legislation, is gradually being replaced by the European EMS earthquake scale.)

Slovenia experiences valley and torrential floods, flooding on karst polje, and sea floods. We distinguish between ordinary or regular floods (one- to ten-year flood intervals) that are not ranked among natural disasters and major catastrophic floods (ten-year and longer flood intervals) that are. Floods threaten almost 3,000 km^2 of Slovenia. The majority are valley floods (237,000 ha) in about thirty major flood areas. Sea floods and karst polje floods are less extensive (70,403 ha). The most frequent causes of floods are violent downpours and the rapid melting of snow. Another very important cause of flooding lies in the local conditions of very dissected hilly areas and the impermeable bedrock of hills that accelerates the rapid run-off of water into the valleys. By clearing forests, cultivating the land, and building almost 6,000 settlements, a road and railway network, and other structures, man has greatly changed the natural drainage conditions. Great changes in flood areas were also caused by the abandonment and deterioration of flourmills, sawmills, and their accompanying structures (dams) after World War II, especially in the years between 1945 and 1955.

The torrential character of rivers and streams has also been intensified by numerous local water management projects and artificial embankments that mostly accelerate the rapid flow of the water. While they protect individual settlements, industrial buildings, roads, and bridges, the destructive effects of the water have increased downstream because of them. Where floods are a regular phenomenon, meadows, pastures, and groves of trees are usually found, which are the most economic forms of land


Flooding
Potential flood area
Avalanches and landslides
Potential avalanche area
Potential landslide area
Freezing rain
Area of major freezing rain
Anticipated strength of earthquakes
Area of 9 degrees MCS
Area of 8 degrees MCS
Area of 7 degrees MCS
Area of 6 degrees MCS
Major fault lines
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Authors: Matej Gabrovec, Milan Orožen Adamič, Miha Pavšek
© Geografski inštitut Antona Melika ZRC SAZU, 2004
LJUBLJANA
MARIBOR
Celje
Kranj
Novo mesto
Koper
Murska Sobota
Ptuj
Nova Gorica
Jesenice
A D R I A T I C S E A

◄ *Figure 1: Natural disaster threat.*

use in these conditions. Into these areas, however, settlements have expanded with residential housing and industrial buildings, railway lines, roads, and bridges that restrain floodwaters with their dikes and thus further increase the danger of catastrophes. With the excessive squeezing of floodwaters by built-up areas and other human encroachments, the destructive power of floodwaters can intensify greatly. This situation occurred with the floods in Celje in 1954 and in the Upper Savinja Valley in 1990.

About 7% of the population of Slovenia lives on land threatened regularly by floods, and more than a quarter of the population has their land, production means, and so forth in areas of major 50-year-interval floods. If the settling in these areas increases at the same rate as between 1961 and 1991, we can expect that floods will present a threat to more than a third of the population of Slovenia at the beginning of the next millennium.

Table 1: Major flood areas in Slovenia.

Flood areas	Areas of regular flooding at 1- to 10-year intervals (in ha)	Areas of catastrophic flooding at 10- to more than 50-year intervals (in ha)	Greatest extent of flooded land (in ha)
Ljubljansko Barje	2,353.10	5,681.10	8,034.20
Dravinja River	3,511.00	3,043.00	6,554.00
Krka River	5,167.00	1,012.20	6,179.20
Lower Savinja Valley	3,157.90	1,130.90	4,288.80
Sava River between Krško and Bregana	2,210.20	1,244.50	3,454.70
Sotla River	2,692.70	558.50	3,251.20
Cerkniško polje	–	–	2,600.00
Kolpa River	659.00	1,387.00	2,046.00
Pšata River	614.20	898.80	1,513.00
Pivka River	–	–	1,151.80
Planinsko polje	–	–	1,100.80
Rižana and Badaševica rivers	–	–	1,077.00
Kočevsko-Ribniško polje	305.00	733.00	1,038.00
Mirna na Dolenjskem	787.90	188.90	976.80
Dragonja and Drnica rivers	–	–	900.00
Hudinja River	370.00	393.00	763.00
Mislinja River	63.30	685.30	748.60
Dobrepolje with Rašica	134.40	490.00	624.40
Bloke Plateau	331.80	258.40	590.20
Poljanska Sora River	–	–	590.00
Grosupeljsko-Radensko polje	84.50	425.20	509.70

In recent years, there has been little snow in Slovenia. However, it was exceptionally abundant in the 1951–1952 winter (Ljubljana 146 cm). Many roads were impassable, and the main road toward Gorenjska was closed for five days, as was the railway line between Jesenice and Nova Gorica. In some places, people were cut off from the rest of the world for even longer periods. There was a general mobilization in Ljubljana to clear the streets. The negative effects of snow differ not only according to the thickness of the snow cover but also to the time of year and where the snow falls. A long-lasting and

thick snow cover can cause great damage in the forests, and in 1952 more than 100,000 m^3 of wood was destroyed.

Table 2: Victims of avalanches between 1777 and 1996.

Casualties	Reliable data	Unreliable data
Mountaineers, hunters, soldiers	71	17
In the open and on ski slopes	25	2
On roads and tracks	88	11
Inside buildings	285	157
Total	469	187

Frosts on fruit trees are frequent in Slovenia at the end of winter and in early fall. Spring frost damages blossoms and reduces the yield. Every 50 to 55 years, invasions of cold air cause frost on fruit trees with major damage.

Hail typically falls on very limited surface areas. It is usually accompanied by a strong wind that considerably increases the damage already caused by the hail. Hailstorms cause the greatest damage in northeastern Slovenia, and Goriška Brda is also greatly threatened.

Figure 2: Demolished building at the end of Sv. Peter Street, today's Trubarjeva Street (Hefler, W., 1895, NUK). Buildings were not destroyed completely during the Ljubljana earthquake, but great damage was caused by falling chimneys, and walls and vaulted ceiling constructions cracked, particularly in those parts of the city where the structure of the ground was most vulnerable. Of 1,373 damaged buildings, only forty-nine were later pulled down. After the earthquake, a law was passed that required a suitable distribution of walls and the installation of iron reinforcing in the brick walls of new buildings.

Although Slovenia has areas that have almost the most precipitation in Europe and although the greater part of its territory receives more than 1,200 mm of precipitation per year, longer periods with little precipitation occur every few years. The basic reason for drought in Slovenia is a relative lack of precipitation, which is mainly the consequence of the fluctuation in annual quantities of precipitation and its varied distribution throughout the year. The occurrence of drought is also heavily influenced by regional characteristics such as permeable carbonate rock in karst regions, steep slopes with a thin layer of soil, soils with little retention capacity, etc. The influence of meteorological factors on droughts in Slovenia is most obvious in the karst region. Water is already scarce here in normal years because it disappears into the heavily fissured bedrock.

The largest part of Slovenia in covered by an area with thirty to forty stormy days every year that stretches from central Slovenia eastwards and at the same time like a tongue down the valley of the Sava River toward the northwest. The mountainous western part of Slovenia is most threatened by storms with forty to fifty stormy days a year and a maximum number in Skalnica near Nova Gorica with more than sixty stormy days every year. The areas of Goriška Brda and Trnovski gozd have fifty to sixty stormy days annually. The summer months of June, July, and August receive 75% of the storms.

The damage caused by wind in Slovenia is considerably greater than we thought until recently. Strong winds are a regular companion of major downpours and thunderstorms. Hurricane winds and tornados are rare in the continental part of Slovenia. On August 23, 1986, a wind with a velocity above 17.2 m/s (8 on the Beaufort scale) ravaged the Notranjska region from Hotedršica to Vrhnika, across Bevke and Podpeč, to the southern margins of the Ljubljansko Barje moor. The bora, Slovenia most famous destructive wind, sweeps across the high Dinaric plateaus and down to the valleys and warm coastal areas. An extremely strong northwest and north foehn wind reaches extreme velocities mainly in the Soca Valley and the Gorenjska region.

Sleet strikes frequently, particularly in southeastern Slovenia and in transitional areas between the Mediterranean world and the interior. It causes the most damage to trees, forests, and a wide variety of infrastructure objects. Along with meteorological conditions, relief conditions are of great importance. Observations show that the intensity of sleeting can vary significantly and changes within short distances. During one catastrophic sleet storm that caused great damage to the electric power grid, the ice coating electric power lines exceeded 50 mm. Sleet thicker than this is rare and occurs approximately once every 30 years. The weight of the thickest measured sleet in Slovenia reached from five to 7.2 kilograms per meter of power line. Weak sleet up to 5 mm thick is frequent throughout Slovenia and occurs in southeastern Slovenia almost every year. Heavier sleet from one to two centimeter thick also occurs here every few years.

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RECENT MASS MOVEMENTS IN SLOVENIA

Matija Zorn
Blaž Komac

Since 1998, Slovenia has witnessed major mass movements caused by extreme precipitation (landslides, debris flows) and earthquakes (rockfalls).

Around 8,000 landslides are active (0.4/km^2) in Slovenia, which is more than the number of settlements in Slovenia. However, barely a quarter of these landslides present a threat to infrastructure and buildings.

The largest known mass movement is the prehistoric Kuntri rockfall on the south slope of Mount Polovnik in the Julian Alps, which totals almost 200,000,000 m^3 (Zorn 2002).

In the past, settlements were built on »safe« areas and potentially »dangerous« areas were only used for extensive activities, but as man's relationship with nature changed, his knowledge of mass movements was mostly lost. Due to human encroachments in higher areas, mass movements and man's interests often collide (Komac and Zorn 2002a).

Table 1: Potential landslide and rockfall source areas in Slovenia.

	Area [km^2]	Percentage of total surface
Potential landslide source areas	1,214.2	6.0
Potential rockfall source areas	699.9	3.5

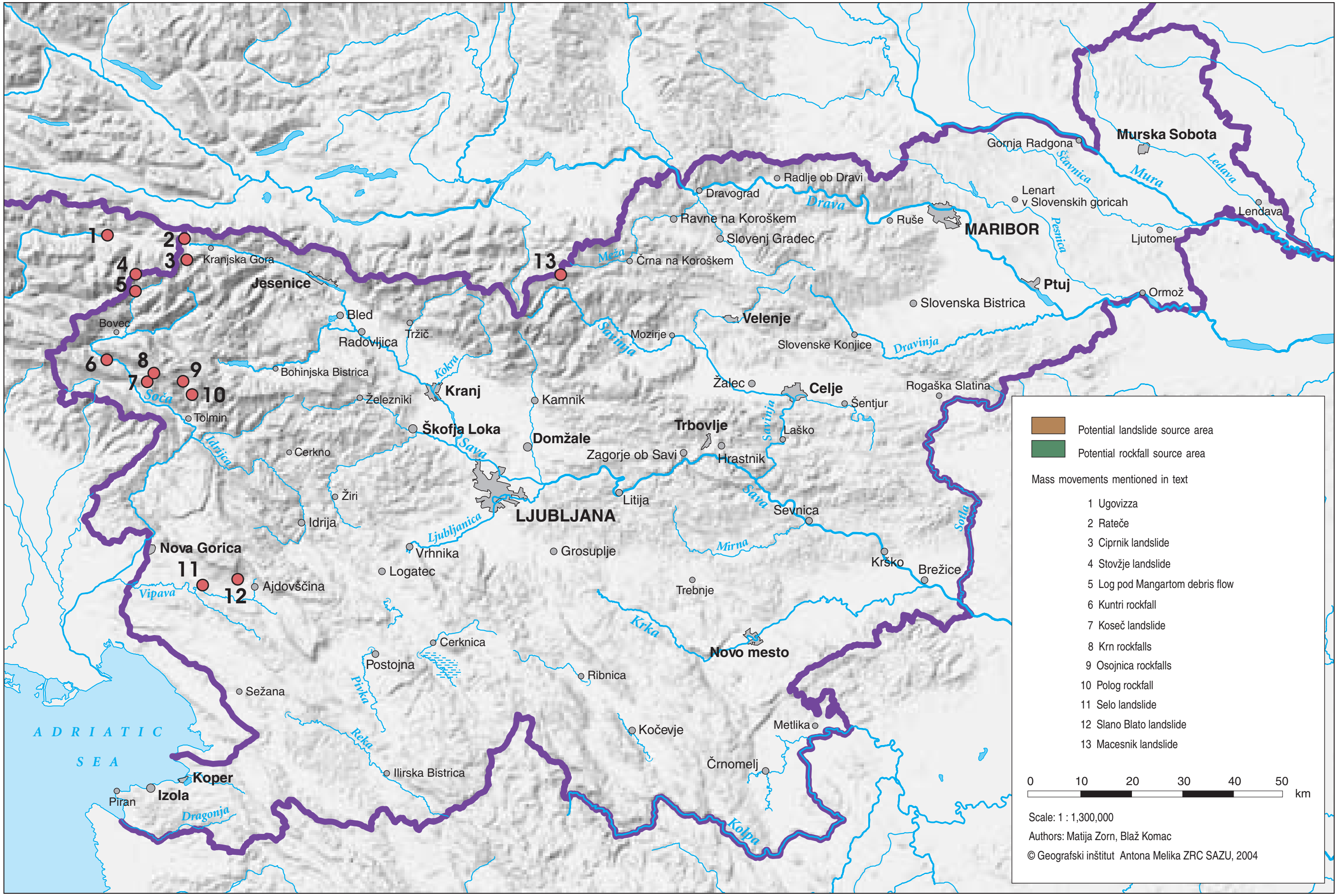
Recent mass movements

Macesnik landslide in the upper Savinja Valley

After extremely heavy rains, many landslides were triggered in the upper Savinja Valley in 1990. Due to the rise of the groundwater and the intensive clearing of forest thirty years earlier, the 2,200-meter long and 100-meter wide Macesnik landslide (2,000,000 m^3) occurred at the contact of limestone and dolomite with the slate claystone lying beneath. Between 1994 and 2000, the landslide moved 850 meters (0.3 meters/day) and then an outcropping of limestone stopped its progress. After it overcomes this rock barrier, its movement could accelerate and the landslide could reach the hamlet below which the valley narrows into a torrent. The houses beneath the landslide and the village of Solčava with its 241 inhabitants are under threat. Protection measures have not been successful because the landslide occurred on the area of a 350-meter wide and 30-meter deep fossil landslide (Pečnik 2002).

Rockfalls in the upper Soča Valley

Earthquakes at higher elevations ground often trigger mass movements. Many such phenomena are known in Slovenia and the neighbouring regions. Extensive rockfalls and landslides were triggered by the Villach earthquake in Austria on January 25, 1348; the Idrija earthquake on March 26, 1551; the Ljubljana earthquake on April 14, 1895; the Litija earthquake on May 19, 1963; earthquakes in



Potential landslide source area
Potential rockfall source area
Mass movements mentioned in text
1 Ugovizza
2 Rateče
3 Ciprnik landslide
4 Stovžje landslide
5 Log pod Mangartom debris flow
6 Kuntri rockfall
7 Koseč landslide
8 Krn rockfalls
9 Osojnica rockfalls
10 Polog rockfall
11 Selo landslide
12 Slano Blato landslide
13 Macesnik landslide
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Authors: Matija Zorn, Blaž Komac
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LJUBLJANA
MARIBOR
Murska Sobota
Gornja Radgona
Lenart v Slovenskih goricah
Lendava
Ljutomer
Ormož
Ptuj
Ruše
Slovenska Bistrica
Slovenske Konjice
Rogaška Slatina
Radlje ob Dravi
Dravograd
Ravne na Koroškem
Slovenj Gradec
Črna na Koroškem
Velenje
Mozirje
Žalec
Celje
Šentjur
Laško
Trbovlje
Hrastnik
Zagorje ob Savi
Litija
Sevnica
Krško
Brežice
Trebnje
Novo mesto
Metlika
Črnomelj
Kočevje
Ribnica
Grosuplje
Domžale
Kamnik
Kranj
Škofja Loka
Tržič
Bled
Radovljica
Jesenice
Kranjska Gora
Bovec
Tolmin
Bohinjska Bistrica
Železniki
Cerkno
Žiri
Idrija
Vrhnika
Logatec
Nova Gorica
Ajdovščina
Postojna
Cerknica
Sežana
Ilirska Bistrica
Koper
Izola
Piran
ADRIATIC SEA
Mura
Ščavnica
Ledava
Drava
Pesnica
Dravinja
Meža
Savinja
Sava
Kokra
Soča
Idrijca
Ljubljanica
Mirna
Krka
Sotla
Kolpa
Vipava
Pivka
Reka
Dragonja

◄ *Figure 1: Potential landslide and rockfall source areas in Slovenia.*

Kozjansko on June 20, 1974; and the Friuli earthquake in Italy on May 6, 1976. The appearance of the landscape was also changed by the earthquake in the upper Soča Valley on April 12, 1998 (M: 5.8; I: VII–VIII EMS), which had its hypocenter at a depth of eight kilometers and triggered more than one hundred rockfalls of various sizes. Several million cubic meters of material were moved (Ribičič and Vidrih 1998).

The rockfalls occurred in uninhabited and hard to reach areas several hundred meters above the bottoms of valleys. Their number increased with their relative altitude because the horizontal acceleration and amplitude of seismic waves increase with altitude. The rockfalls did not affect people but only caused some damage to mountain pastures and mountain trails. The largest rockfalls occurred in the southwestern wall of Mount Krn (2,244 m), where rockfall material was deposited over fifteen hectares, and on Mount Osojnica above the valley of the Tolminka River (30 hectares; Natek et al. 2003).

Stovžje and Ciprnik landslides, and the debris flow in Log pod Mangartom

A landslide (2,500,000 m^3) was triggered west of Mount Mangart (2,679 m) on November 15, 2000, between 1,340 and 1,580 meters above sea level that stopped in the valley of the Mangartski potok stream. Due to the abundance of water it carried with it, a debris flow occurred on November 17, 2000, that took seven lives and destroyed several houses and outbuildings in Log pod Mangartom. New houses were built for the stricken inhabitants, and the construction of safety barriers above the village is planned because the material remaining in the slide area is not stable.

Figure 2: Rockfalls on Mount Krn (photography Matija Zorn).

Figure 3: Fan of the debris flow in Log pod Mangartom (photography Blaž Komac).

Figure 4: The Stovžje landslide on the left and the alluvial fan of the debris flow in Log pod Mangartom on the right with Mount Mangart in the middle (photography Matija Zorn).

On the night of November 18, 2000, a landslide (60,000 m^3) was triggered on the west slope of Mount Ciprnik (1,745 m) that partially changed into a debris flow and destroyed the forest and part of the road through the Planica Valley lying 600 meters lower.

In both cases, the main cause of sliding was the Tamar rock formation (alternating layers of sandstone, claystone, limestone, and dolomite) or its weathered debris (clay minerals) that swells when soaked. The parallel incidence of the rock layers also contributed to the movement.

Heavy precipitation triggered both slides. In November 2000, 1,234 mm of rain (50% of the annual average) fell in Log pod Mangartom. Debris flows of larger dimensions occurred in the vicinity of Bovec and in the Planica Valley in the Pleistocene. In the historical period, place names and historical sources mentioning similar events 300 and 110 years ago also reveal their occurrence (Zorn and Komac 2002).

Slano Blato landslide in the Vipava Valley

A landslide caused by abundant precipitation occurred in the valley of the Grajšček stream above the village of Lokavec near Ajdovščina on November 18, 2000. The kilometer long and 280-meter wide landslide at 330–630 meters above sea level affected twenty-five hectares of flysch rock and slope rubble covered with forest and meadow vegetation. The highest velocity of the slide was 90 meters/day.

The landslide lies below the thrust of carbonate rock of Trnovski gozd on the flysch of the Vipava Valley. Along the thrust, the rock is damaged and broken and therefore subject to weathering. On the slopes, a several dozen meter deep talus of slope rubble developed that is additionally labile due to the numerous abundant springs at the thrust contact. Landslides occurred here 200 and 100 years ago, and in the immediate vicinity near Selo there is an enormous (100,000,000 m^3) Pleistocene landslide (Kovač and Kočevar 2001; Popit and Košir 2003).

Mass movements above the village of Koseč in the upper Soča Valley

Above the village of Koseč, fissures developed on the slope during the earthquake on April 12, 1998, into which water flowed. Later, steps up to one meter high formed, alongside which one-decimeter horizontal shifts occurred until one of the larger landslides in Slovenia (675,000 m^3) was triggered on December 22, 2001. It lies 130 meters above the village and moves at 1.2 meters per month. Rockfalls occur on the steep slope above the landslide, and after heavier precipitation, smaller debris flows (1,000 m^3) travel down the course of the Brsnik and Ročica streams to the valley (Komac and Zorn 2002c).

The main causes are the fractured and unstable rock and the water that seeps out at the contact between Lower Cretaceous flysch and *scaglia* (plate limestone and marl) during rains.

Mass movements endanger Koseč and its 61 residents and Ladra and its 153 residents. Moving the inhabitants of six houses in the endangered area is foreseen. A map of the influence area of the Koseč landslide and a map of the potential threat from major mass movements for the wider area of Kobarid have been elaborated. In the vicinity of Koseč, more sliding occurred on April 18, 1994, when a 50-meter long landslide covered a road (Pavšek 1994; Natek et al. 2003; Ribičič and Hočevar 2003).

Torrential alluvia in Rateče and Ugovizza

At the end of August in 2003, the tri-border area between Italy, Austria, and Slovenia was struck by a major storm. In the last three days of August, 274 mm of precipitation fell in Rateče, considerably more than the August average (158 mm). Due to the large water discharge (0.7 $m^3/km^2/s$), the Trebiža brook threatened to destroy houses in Rateče and deposited debris and mud beneath the village. A similar occurrence in 1885 covered twelve hectares of cultivated fields and meadows.

In August of 2003, torrential alluvia blocked traffic on the Vršič and Predel passes and covered the road between Jesenice and Rateče. Austrian Carinthia and Italy's Valcanale Valley were affected as more

than 400 millimeters of precipitation fell, destroying the road in thirteen places and cutting the Udine–Villach railway line. Fourteen days before the 100th anniversary of a similar event that is remembered by the street name »*Via 13. Settembre 1903 alluvione*,« the Ugovizza stream covered the western part of the town of Ugovizza. Two people died, and more than three hundred fled their homes. Sources from the end of the 18th century also describe the dangerous nature of the Ugovizza stream.

Rockfall near Polog in the Tolminka River valley

After abundant April precipitation, a rockfall composed of Cretaceous flysch with alternating layers of marl, sandstone, calcarenite, and limestone breccia was triggered on May 5, 2004, near Polog in the valley of the Tolminka River.

The rockfall source and influence area is 600 meters wide and 450 meters long. The rockfall swept away twenty hectares of forest but does not present a direct threat to settlements or infrastructure. In two places, it filled the Tolminka stream, which rose by ten meters in two 200-meter-long lakes behind the dams.

Conclusion

The mass movements described above are very large ones. The four large landslides together total six million cubic meters, about 1.5 tons of material for each resident of Slovenia.

Other landslides are smaller. The average volume of 225 landslides of known size is 28,000 m^3 and their average area is 0.7 hectare. Together these landslides total 3.2 m^3 of material per capita and their surface is 0.8 m^2 per capita.

Figure 5: Wedge-shaped rockslide in the Lepena Valley triggered by the earthquake on April 12, 1998 (photography Matija Zorn).

Table 2: Most important parameters of major landslides in Slovenia.

Landslide	Koseč	Slano Blato	Stovžje	Macesnik
Area [ha]	10	20	25	19
Thickness [m]	10	10	10	10–14
Length [m]	600	1,100	900	2,200
Width [m]	to 150	to 200	to 400	to 100
Altitude [m]	730–1,200	360–660	1,340–1,580	800–1,350
Volume [m^3]	675,000	1,000,000	2,500,000	2,000,000
Volume per resident of Slovenia [m^3/capita]	0.3	0.5	1.3	1.5
Beginning of processes	22. 12. 2001	18. 11. 2000	15. 11. 2000	November 1990
Current state	active	active	temporarily stable	active

Table 3: Basic characteristics of 225 landslides of known size in Slovenia.

parameters	average
length (m)	128
width (m)	55
depth (m)	4
area (ha)	0.7
volume (m^3)	28,160

The geomorphic processes described here are natural processes that cannot be stopped, and therefore appropriate adaptation is often the major limiting factor for urban and economic development. In higher regions, usable space is limited to just the edges of the valleys because other areas are threatened. From the perspective of geomorphic events, the phenomena we have witnessed in Slovenia in recent years are neither rare nor special. While alluvial fans, for example, seem to be »most suitable« places for building, we keep forgetting that they originated from the same exceptional geomorphic phenomena as those described above (Natek 2003).

Not taking acquired experience or the actual threat to individual areas into account can have devastating consequences, and therefore the inclusion of potentially threatened areas in the Strategy of Spatial Development of Slovenia (2003) was necessary. With the implementation of legislation and regulations, we can hope for better spatial planning in the future, but we still need a detailed analysis of the potential threat from mass movements to built-up and populated areas.

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POPULATION DEVELOPMENT OF SLOVENIA FROM THE BEGINNING OF COUNTING TO THE PRESENT DAY

Damir Josipovič

According to its numbers, the Slovene population belongs ethnically and nationally among the smaller populations of European countries. However, it is distinguished by its historic endurance and continuity in Slovenia and in neighbouring areas since the 6th century. The existence of the Slovene people as an ethnic group that survived in spite of strong assimilation pressures and which managed to preserve the Slovene language as the main distinguishing component of ethnicity largely throughout its rural hinterland provided the foundation for the formation of modern Slovenia. Throughout its history from its initial colonization in the 6th century, Slovene ethnic territory shrank constantly. In the first few centuries after colonization, the settling area of our Slovene ancestors encompassed the majority of the territory of today's Austria, more than a third of Hungary and Croatia, and eastern border areas of today's Italy. Relative to the size of today's Slovenia, this ethnic territory shrank most in the north and east, and least in the west. As an independent country, Slovenia is the millennium-long dream of the Slovene people come true, but a considerable area populated by speakers of autochthonous Slovene dialects still remains outside the state borders. Thus today, Slovenia has autochthonous minorities in all four neighbouring countries.

In the time since the first estimates of the population on the territory of today's Slovenia in the middle of the 18th century and the first censuses a good century later, the Slovene population has not increased as other European populations then comparable with the Slovene population have. In the 19th centu-

Figure 1: Manual farm work has almost disappeared (photography Marjan Garbajs).

Table 1: Number and gender of the population of Slovenia and changes in the number after the population censuses in the period between 1857 and 2002.

	1857	1869	1880	1890	1900	1910	1921	1931	1948	1953	1961	1971	1981	1991	2002
TOTAL	1.101.854	1.128.768	1.182.223	1.234.056	1.268.055	1.321.098	1.304.800	1.397.650	1.439.800	1.504.427	1.591.523	1.727.137	1.891.864	1.913.355	1.964.036
Men (m)	535.945	545.614	576.964	601.031	618.065	643.898	622.168	673.248	675.353	712.034	760.770	835.998	918.766	923643	958.576
Women (w)	565.909	583.154	605.259	633.025	649.990	677.200	682.632	724.402	764.447	792.393	830.753	891.139	973.098	989712	1.005.460
Absolute Difference	0	26.914	53.455	51.833	33.999	53.043	–16.298	92.850	42.150	64.627	87.096	135.614	164.727	21.491	50.681
Absolute Diff. (m)	0	9.669	31.350	24.067	17.034	25.833	–21.730	51.080	2.105	36.681	48.736	75.228	82.768	4.877	34.933
Absolute Diff. (w)	0	17.245	22.105	27.766	16.965	27.210	5.432	41.770	40.045	27.946	38.360	60.386	81.959	16.614	15.748
Index	100	102.4	107.3	112.0	115.1	119.9	118.4	126.8	130.7	136.5	144.4	156.7	171.7	173.6	178.2
Chain Index	100	102.4	104.7	104.4	102.8	104.2	98.8	107.1	103.0	104.5	105.8	108.5	109.5	101.1	102.6
Index (m)	100	101.8	107.7	112.1	115.3	120.1	116.1	125.6	126.0	132.9	141.9	156.0	171.4	172.3	178.9
Chain Index (m)	100	101.8	105.7	104.2	102.8	104.2	96.6	108.2	100.3	105.4	106.8	109.9	109.9	100.5	103.8
Index (w)	100	103.0	107.0	111.9	114.9	119.7	120.6	128.0	135.1	140.0	146.8	157.5	172.0	174.9	177.7
Chain Index (w)	100	103.0	103.8	104.6	102.7	104.2	100.8	106.1	105.5	103.7	104.8	107.3	109.2	101.7	101.6

Source: Šifrer 1963; SURS; our own calculations; Census data refers to the current territory of Slovenia. Calculations for the current territory for censuses between 1857 and 1910 are summarized from Ž. Šifrer – Stanovništvo 3/1963).

ry, the Slovene population ranked among the medium-sized populations of the European space and in numbers was roughly comparable with the neighbouring Croatian and Serbian populations, if we limit ourselves to just the populations in our immediate vicinity. However, the Serbian population in particular experienced a rapid expansion during the 20th century, and today the Serbian population is about five times larger than the Slovene population, while the Croatian population is twice its size. The reasons for the very low increase in the Slovene population are numerous, the most important being emigration of a large part of active population mostly to overseas countries and the simultaneous start of a decline in the birth rate. One of the basic factors of this development is certainly the lack of a Slovene nation-state. Thus in comparison with other ethnic populations, demographic transition did not bring comparable population surpluses. The same is true of all populations who have been without their own state for a long time. Among the classic nation-states in Europe today, only the Estonian population is smaller than the Slovene population. The reason for this lies in the political power of the country, which could acquire speakers through its official language policy at the expense of languages whose status was not officially recognized.

A comparison of census data shows that the number of inhabitants on the current territory of Slovenia has not even doubled since the first census and that growth was not steady in the periods between censuses. The period between 1857 and 1910 was marked by a quite constant but weak growth in the number of the population. This growth would have been considerably higher had the population not started to emigrate intensively in the second half of the 19th century, mostly due to agrarian overpopulation and the general socio-economic crisis. The extent of emigration has been so large that along with the Irish and the Croats, Slovenes rank to the very top of European emigration. Between 1910 and 1921, the number of the population even regressed, which can be attributed to large war losses and the additional emigration mostly from the western part of Slovenia (Primorska) that was granted to Italy as spoils of war after World War I. Between 1921 and 1948, the Slovene population did record growth,

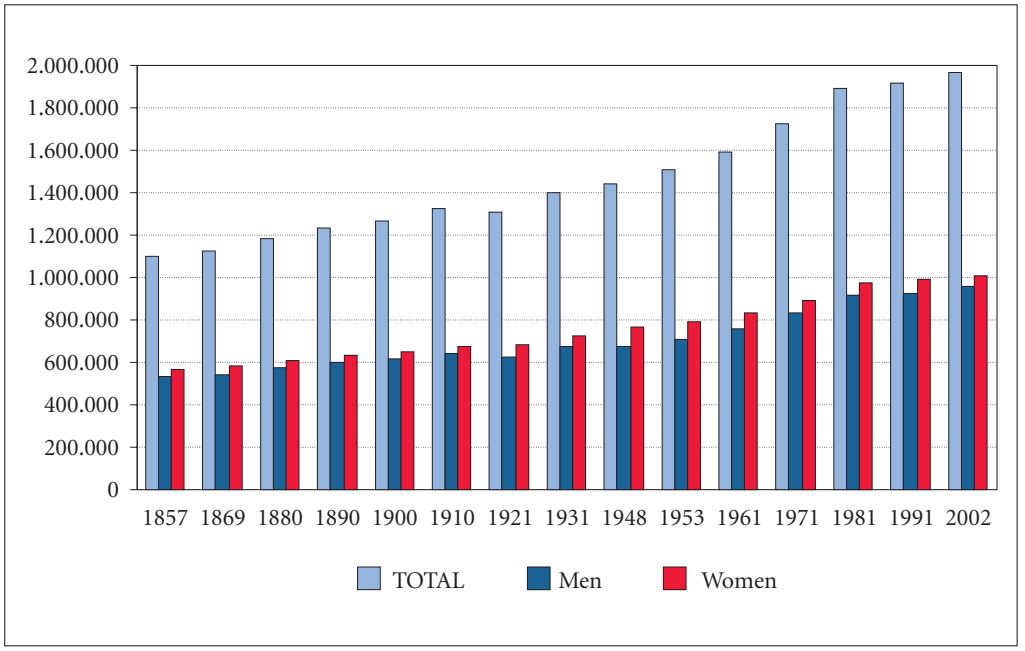
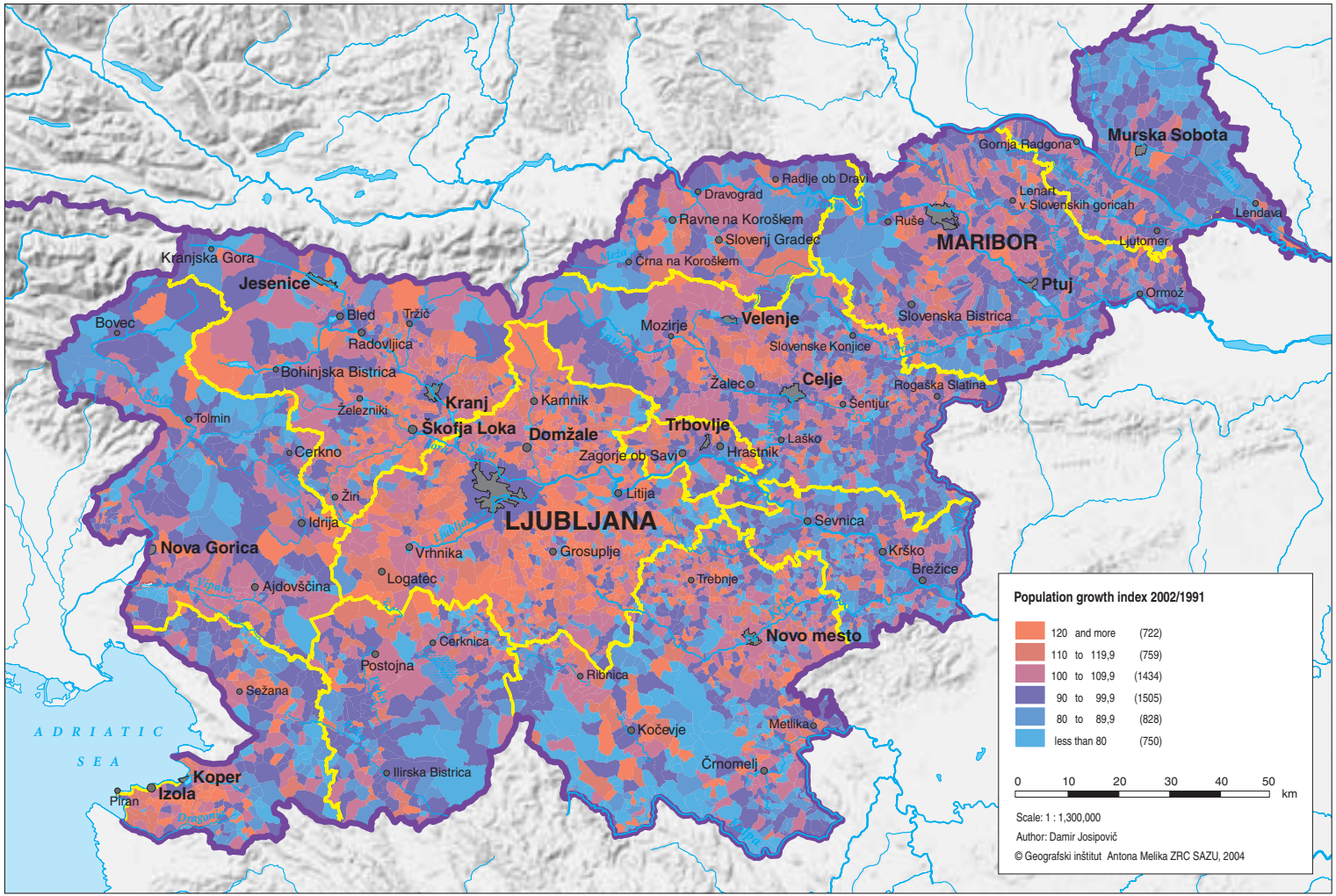


Figure 2: Number and gender of the population of Slovenia according to censuses between 1857 and 2002 (Source: Ibid.).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Ribnica
Sežana
Kočevje
Metlika
ADRIATIC SEA
Črnomelj
Koper
Izola
Piran
Ilirska Bistrica
Population growth index 2002/1991
120 and more (722)
110 to 119,9 (759)
100 to 109,9 (1434)
90 to 99,9 (1505)
80 to 89,9 (828)
less than 80 (750)
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Damir Josipovič
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◄ *Figure 3: Change in the population by settlements in Slovenia between 1991 and 2002 (Source: our own calculations, SURS).*

but this was reduced because of the continuation of emigration and losses as a consequence of World War II. After World War II with the post-war baby boom, emigration continued into the 1950's, but after that period Slovenia became an immigration area as a result of rapid industrialization. Emigration to foreign countries dropped markedly while the influx of the population from other parts of the former Yugoslavia increased. Because the natural increase still ensured a relative surplus, the number of the population increased considerably with positive migration balance, especially in the period between 1971 and 1981. The data for the census years 1991 and 2002 is not quite comparable with previous data because of a different definition of the population, which is now the same in Slovenia as it is in the majority of European Union countries. For this reason, the census data gives the impression that the population practically ceased to grow after 1981. However, this is not true. If we compare the data for 1981 and 1991 acquired using the same methodology, we realize that the population increased by a good 70,000. This increase is in accordance with the natural increase and the migration balance of the period of the 1980's. In the second half of the 1980's, immigration to Slovenia from other parts of Yugoslavia decreased considerably, but at the same time the natural increase also decreased, and in 1993 was negative for the first time since World War II. Since 1997, the natural increase in Slovenia has remained negative. The period between the last two censuses does mark a growth in the number of the inhabitants, but this growth is mostly due to immigration, a different method of gathering information, and a new definition of the population.

The Slovene population in the last period is characterized by stagnation in the number along with an unfavourable age structure, which is rooted largely in the drastically reduced birth rate. This low birth rate ranks Slovenia at the bottom of European countries. The period of strong migration to Slovenia

Figure 4: Traditional pottery still lives today (photography Jože Pojbič).

from areas of the former Yugoslavia that concealed the seriousness of the decline of the birth rate ended with the independence of Slovenia. If the birth rate continues to decrease or stagnate, the migration balance will have to increase substantially to maintain the number of the population at the level of about two million. In the last decade, there has again been a trend toward a slight increase of immigration, but the increase is still far below the number necessary to replace annual generation losses.

Within Slovenia, substantial differences exist in the number development of the population. The map shows the changes in the population according to settlements in the last period between censuses. Along with the general relative stagnation or the low total growth of the population of Slovenia, higher growth is distinctly evident mainly in the urban Ljubljana region while other, mostly rural and border areas have suffered strong depopulation. Such development is the consequence of the uneven regional development that Slovenia has witnessed particularly in the last decade.

ETHNIC STRUCTURE OF SLOVENIA AND SLOVENES IN NEIGHBOURING COUNTRIES

Jernej Zupančič

Slovenes belong among the less numerous nations of the world and of Europe, and the Slovene language is among the less widespread languages. However, Slovene communities are historically recognized and acknowledged, ethnically and culturally vital, and spatially stabile. Of the some 2.5 million Slovenes and persons of Slovene ethnic origin, almost one third live outside Slovenia. Identification according to ethnic background is very difficult, especially among the second and later generations of emigrants, because the most recognizable sign and simultaneously the symbol of Slovene ethnicity, the language, has often already been replaced by the language of the area in which they live. However, the culture and consciousness of belonging has preserved. About 1,800,000 Slovenes live in Slovenia (during the 2002 census, 1,632,000 people identified themselves as Slovene. Because of the methodology used for this census, the number of members of most ethnic groups dropped significantly. The ethnicity of some 200,000 people was not established at all because it was unknown, they did not wish to identify themselves by ethnicity, etc. We therefore give, if possible, estimates for the number of individuals in ethnic minorities.), and the rest live in neighbouring countries as members of minorities and as immigrants in various countries around the world. Autochthonous Slovene minorities live in the border areas of all the neighbouring countries. In Italy, Slovenes occupy 1,500 km^2 of the territory in Friuli-Venezia Giulia, where between 83,000 and 100,000 Slovenes live according to Slovene estimates, and 52,000 according to official (Italian) estimates. About 10,000 Slovenes live in the Friulian plain outside the region of autochthonous settlement. For several centuries the area belonged to the Aquileian Patriarchate and the Counts of Gorizia, mostly to the Habsburgs from the 15th century to 1918, and after 1918, to Italy. The Slovene minority in Austria occupies about 2,600 km^2 of the territory in southern Carinthia and Styria, where according to official Austrian data from the 2001 census, about 13,000 Slovenes live, and according to Slovene estimations, around 45,000. More than 5,000 Slovenes live outside the autochthonous area, mostly in Vienna and Graz. After the fall of the Principality Karantanija, the area was under the dominance of the Franks, and then under the Habsburg Monarchy for almost a millennium until its collapse in 1918. The current border was set by the plebiscite in October of 1920. In Hungary, Slovenes occupy about 100 km^2 of the territory in Porabje and Železna županija. According to official data of the 2001 census, there were about 2,500 Slovenes, while according to Slovene estimates, about 5,000 Slovenes live in Hungary (around 2,000 Slovenes live scattered elsewhere across Hungary). From the 11th century on, the area was under Hungarian rule, and the current border was set by the Trianon Peace Treaty in 1920. In the period between 1948 and 1990, this border was closed because of the »Iron Curtain« while connections with other areas of Slovene settlement were almost interrupted. The autochthonous Slovene minority in Croatia altogether numbers several hundred people who live in five small and separate areas. The majority of Slovenes in Croatia are emigrants and their descendants. Emigration, which totaled more than a fifth of the Slovene people, took shape in five phases: an economic phase until World War I, a predominantly political phase in the period between the two World Wars, deportees during World War II, deportees and refugees immediately following World War II, and economic emigration after 1960. According to estimates, the most citizens of Slovene origin lives in the United States (300,000), Germany (50,000), Canada (30,000), Argentina (30,000), Australia (25,000), Croatia (25,000), Serbia (10,000), Austria, Italy, France, Sweden, Brazil, and elsewhere. »Zdomci« or guestworkers represent a special type of emigration: temporary but as a rule long-term emigration that has left a visible impact on the external appearance and

function of Slovene regions. According to the 1991 census (the 2002 census no longer included this category of the population), there were almost 53,000 »zdomci,« mostly living in Germany, Austria, Switzerland, and Italy.

The location of Slovene territory at the contact of the Slavic, Germanic, Romance, and Finno-Ugric peoples influenced the culture, language, and identity of this area and its population. In its ethnic structure, the Slovene population dominated in all periods but was almost never homogenous, with the exception of a decade or so following World War II. Frequent changes of political borders and mass migrations – regardless of their causes – introduced great cultural dynamics into the Slovene space and its periphery that resulted in the presence in Slovenia of ethnic minorities, ethnic groups and immigrant communities on the one hand and various Slovene emigrant communities dispersed throughout the world on the other. This situation defined the fundamental dimensions of the Slovene national question in the spatial, political, and cultural-lingual sense and greatly helped Slovenia create a system for the protection of minorities that is almost beyond compare elsewhere while still in the period of its partial autonomy in the framework of the former Yugoslavia. Slovenia's minority policies are important not only in terms of ensuring human rights, political peace, and international reputation but also contribute substantially to the development in particular of bordering peripheral areas.

Major changes in the ethnic structure of the population of Slovenia

The exposed geopolitical location of Slovene territory and its position between much more populous neighbours gave it great strategic significance in almost all historical periods. For this reason, the pressure on this territory has always been very strong and the sequence of various governing powers fostered the change of political borders and of the ethnic structure of the population, which changed a great deal in the last century.

According to the last census taken the Austro-Hungarian Monarchy in 1910, the population of the territory of today's Slovenia included 82% Slovenes, almost 10% Germans, 2% Italians, and 1.5% Hungarians. In the current territory of autochthonous settlement of Slovene minorities in neighbouring countries, there were 110,000 Slovenes in Austria, 120,000 in Italy, and about 6,000 in Hungary. At the same time, this was also a period of the large Slovene exodus when almost half a million people left Slovene territory between 1870 and 1914. The population structure began to change rapidly after the disintegration of the Austro-Hungarian Monarchy when the German and Hungarian populations – previously the majority populations in the Monarchy – became minorities in the new country of Yugoslavia. The number of Germans in particular dropped rapidly, and of the prewar 106,000 Germans, 42,000 were left in 1921, and only about 29,000 ten years later. The number of Hungarians dwindled more slowly. Both communities grew smaller partly because of emigration but even more so because of an objective or solely »statistical« change of identity. On the other hand, the number of the Italians increased because Italy occupied western Slovenia following the Treaty of Rapallo that resulted from the British-Italian London Agreement. Slovenes moved away from the region in great numbers, fleeing from the aggressive fascist administration of Mussolini's Italy, and some were even forcefully deported. At least 40,000 Slovenes left. The number of members of the Slovene minority in Austrian Carinthia dropped rapidly and heavily due to the oppressive measures of the Austrian authorities; in 1923, they numbered about 35,000, while the Nazi census in 1939 counted 42,000. The number of Slovenes in Hungary also decreased. Further radical changes followed, particularly during World War II and in the following decade. Along with the considerable number of victims among the Slovene population due to the fighting, deaths in concentration camps and the postwar mass executions took up to 80,000 people. More than 20,000 Slovenes settled in different countries as refugees and displaced persons, mostly in Argentina, Canada, Australia, and the United States. During the war, the Italians deported about 15,000 Kočevje Germans to the territory of the wartime Third Reich in Posavje where more than

40,000 Slovenes were deported from their homes in the German part of occupied territory. After the war, almost the entire German population left Slovene territory in fear of reprisals and because of deportations. The majority of Italians (about 22,000) in Slovene Istria also left in the decade after World War II because of strong Italian propaganda on one hand and poor economic prospects on the other. As a result, Slovenia became ethnically quite homogenous (in 1948, about 97% of the population was Slovene), but not for long. Although the permanent and temporary emigration of the Slovene population (over 30,000) continued primarily for economic reasons in the period after World War II, the number of immigrants soon outnumbered the number of emigrants after the rapid industrialization and social modernization. Slovenia became an immigration country and society with all the characteristic features of social relationships and processes. The number of members of various Yugoslav nations increased while the proportion of Slovenes dropped to 88% in 1991 and 83% in 2001. Today, more than 50,000 Croatians, about 45,000 Serbs, 40,000 Bosnian Muslims, and 6,000 Albanians live in Slovenia. Among the autochthonous communities, there are 10,000 Hungarians, almost the same number of Romany, and about 3,000 Italians, and these three groups have special minority status and protection. According to the 2002 census, there were 2,258 Italians, 6,243 Hungarians, 3,246 Romany, 499 Germans, 181 Austrians, 28 Jews, 6,186 Albanians, 2,667 Montenegrins, 3,972 Macedonians, 38,964 Serbs, 35,642 Croats, 10,467 Muslims, 21,542 Bosnian Serbs, 8,062 Bosnian Croats and a number of other very small communities, altogether more than thirty different ethnic groups. In the 1990's, the number of immigrants from non-European countries also began to increase: Chinese, Indian, Pakistani, etc. Although their numbers are very modest, an increasing trend is quite distinct.

In the areas of autochthonous settlement of Slovene minorities in neighbouring countries, the steady numerical drop in the minority communities is primarily due to assimilation and partly to emigration from peripheral rural and border areas as well. For this reason, the spatial expansion of the settlement area along with the decrease in the number of minority communities and the dwindling of their relative number in areas of autochthonous-traditional settlement is a characteristic phenomena.

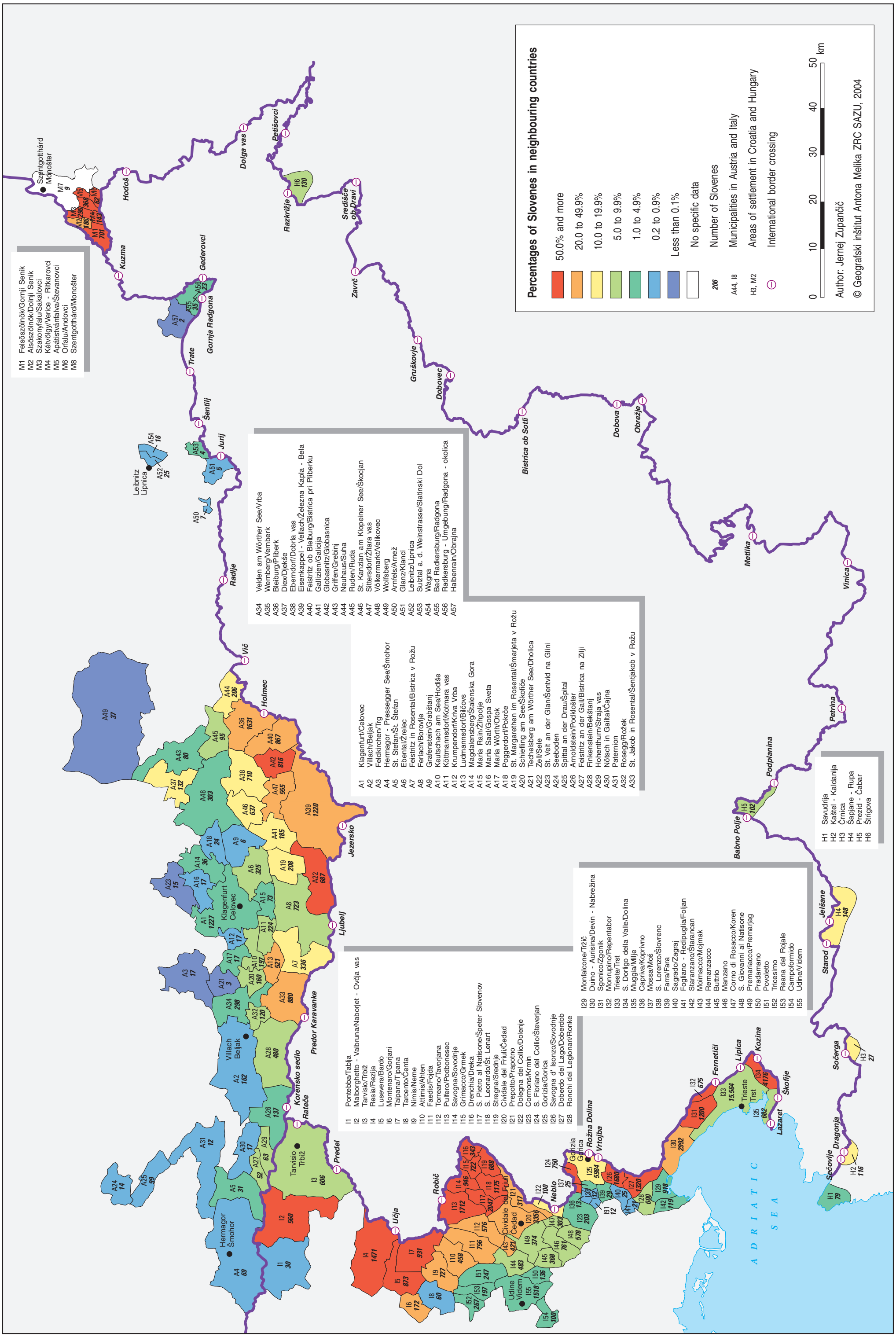
Formal and actual situation of minorities in Slovenia and of Slovenes in neighbouring countries

Efforts to solve the problems of minorities, minorities in Slovenia as well as Slovene minorities in the neighbouring countries, have been a constant in the internal and foreign policies of Slovenia. Thus, already in the period of postwar Yugoslavia – even while the echoes of World War II and its consequences were still resounding – the foundations for the protection of minorities were established. Thus, of course in accordance with the starting points of diplomatic achievements between Yugoslavia and neighbouring Italy and Hungary, the Hungarian and Italian minorities were granted legal protection, which was on a substantially higher level in Slovenia than in Croatia and Serbia, particularly if we consider the quite modest number of their members. After independence, Slovenia further increased the legal standards of protection, in spite of the fact that the situation of Slovenes in Italy and Hungary is legally and actually considerably poorer. Slovenia therefore did not merely adhere to the principle of reciprocity. Minority protection covers several levels and spheres; those of key importance are:

(1) representation: guaranteed mandates in parliament and positions for councillors in municipalities; on the basis of special additional voting rights, every member of a minority therefore has two votes in elections;

(2) bilingualism: consistent bilingual topography and bilingualism in official institutions and documents in the area of traditional settlement;

(3) education: Italian and bilingual Slovene-Hungarian elementary and secondary schools in areas of autochthonous settlement;


Percentages of Slovenes in neighbouring countries
50.0% and more
20.0 to 49.9%
10.0 to 19.9%
5.0 to 9.9%
1.0 to 4.9%
0.2 to 0.9%
Less than 0.1%
No specific data
206 Number of Slovenes
A44, I8 Municipalities in Austria and Italy
H3, M2 Areas of settlement in Croatia and Hungary
International border crossing
0 10 20 30 40 50 km
Author: Jernej Zupančič
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M1 Felsőszölnök/Gornji Senik
M2 Alsószölnök/Dolnji Senik
M3 Szakonyfalu/Sakalovci
M4 Kétvölgy/Verice - Ritkarovci
M5 Apátistvánfalva/Števanovci
M6 Orfalu/Andovci
M8 Szentgotthárd/Monošter
A1 Klagenfurt/Celovec
A2 Villach/Beljak
A3 Feldkirchen/Trg
A4 Hermagor - Pressegger See/Šmohor
A5 St. Stefan/Št. Štefan
A6 Ebental/Žrelec
A7 Feistritz in Rosental/Bistrica v Rožu
A8 Ferlach/Borovlje
A9 Grafenstein/Grabštanj
A10 Keutschach am See/Hodiše
A11 Köttmannsdorf/Kotmara vas
A12 Krumpendorf/Kriva Vrba
A13 Ludmannsdorf/Bilčovs
A14 Magdalensberg/Štalenska Gora
A15 Maria Rain/Žihpolje
A16 Maria Saal/Gospa Sveta
A17 Maria Wörth/Otok
A18 Poggersdorf/Pokrče
A19 St. Margarethen im Rosental/Šmarjeta v Rožu
A20 Schiefling am See/Škofiče
A21 Techelsberg am Wörther See/Dholica
A22 Zell/Sele
A23 St. Veit an der Glan/Šentvid na Glini
A24 Seeboden
A25 Spittal an der Drau/Špital
A26 Arnoldstein/Podklošter
A27 Feistritz an der Gail/Bistrica na Zilji
A28 Finkenstein/Bekštanj
A29 Hohenthurn/Straja vas
A30 Nötsch in Gailtal/Čajna
A31 Paternion
A32 Rosegg/Rožek
A33 St. Jakob in Rosental/Šentjakob v Rožu
A34 Velden am Wörther See/Vrba
A35 Wernberg/Vernberk
A36 Bleiburg/Pliberk
A37 Diex/Djekše
A38 Eberndorf/Dobrla vas
A39 Eisenkappel - Vellach/Železna Kapla - Bela
A40 Feistritz ob Bleiburg/Bistrica pri Pliberku
A41 Gallizien/Galicija
A42 Globasnitz/Globasnica
A43 Griffen/Grebinj
A44 Neuhaus/Suha
A45 Ruden/Ruda
A46 St. Kanzian am Klopeiner See/Škocjan
A47 Sittersdorf/Žitara vas
A48 Völkermarkt/Velikovec
A49 Wolfsberg
A50 Arnfels/Arnež
A51 Glanz/Klanci
A52 Leibnitz/Lipnica
A53 Sulztal a. d. Weinstrasse/Slatinski Dol
A54 Wagna
A55 Bad Radkersburg/Radgona
A56 Radkersburg - Umgebung/Radgona - okolica
A57 Halbenrain/Obrajna
I1 Pontebba/Tablja
I2 Malborghetto - Valbruna/Naborjet - Ovčja vas
I3 Tarvisio/Trbiž
I4 Resia/Rezija
I5 Lusevera/Bardo
I6 Montenaro/Gorjani
I7 Taipana/Tipana
I8 Tarcento/Čenta
I9 Nimis/Neme
I10 Attimis/Ahten
I11 Faedis/Fojda
I12 Torreano/Tavorjana
I13 Pulfero/Podbonesec
I14 Savogna/Sovodnje
I15 Grimacco/Grmek
I16 Drenchia/Dreka
I17 S. Pietro al Natisone/Špeter Slovenov
I18 S. Leonardo/Št. Lenart
I19 Stregna/Srednje
I20 Cividale del Friuli/Čedad
I21 Prepotto/Prapotno
I22 Dolegna del Collio/Dolenje
I23 Cormons/Krmin
I24 S. Floriano del Collio/Števerjan
I25 Gorizia/Gorica
I26 Savogna d' Isonzo/Sovodnje
I27 Doberdo del Lago/Doberdob
I28 Ronchi dei Legionari/Ronke
I29 Monfalcone/Tržič
I30 Duino - Aurisina/Devin - Nabrežina
I31 Sgonico/Zgonik
I32 Monrupino/Repentabor
I33 Trieste/Trst
I34 S. Dorligo della Valle/Dolina
I35 Muggia/Milje
I36 Capriva/Koprivno
I37 Mossa/Moš
I38 S. Lorenzo/Šlovrenc
I39 Farra/Fara
I40 Sagrado/Zagraj
I41 Fogliano - Redipuglia/Foljan
I42 Staranzano/Štarancan
I43 Moimacco/Mojmak
I44 Remanzacco
I45 Buttrio
I46 Manzano
I47 Corno di Rosacco/Koren
I48 S. Giovanni al Natisone
I49 Premariacco/Premarjag
I50 Pradamano
I51 Povoletto
I52 Tricesimo
I53 Reana del Rojale
I54 Campoformido
I55 Udine/Videm
H1 Savudrija
H2 Kaštel - Kaldanija
H3 Črnica
H4 Šapjane - Rupa
H5 Prezid - Čabar
H6 Štrigova
A D R I A T I C
S E A

◄ *Figure 1: Indigenous Slovene minorities in neighbouring countries.*

(4) media: full financial support for minority newspapers, radio stations, and television channels (Italian) or programs (Hungarian);
(5) culture: a special fund from the national resources is devoted to minority cultural organizations;
(6) economy: limited financial support exclusively for entrepreneurship among the minority population is available.

Although the policies described above are consistently implemented, both minorities have substantial problems originating in their low numbers and peripheral locations. The minorities share the fate of the entire region. In particular, the situation of the Hungarians settled along the Slovene-Hungarian border is quite poor due to the structural problems of this demographically threatened region, and the minority is continuously dwindling as its young people move away. The autochthonous Romany community, which also receives special care from the state, has different problems, mostly socioeconomic. In spite of substantial efforts, it is still a marginal community. Other groups of the population such as the small German, Austrian, and Jewish communities and the numerically superior communities of the ethnic groups from the former Yugoslavia that developed through immigration largely since the 1960's do not have any special minority rights as the Italians and Hungarians do. However, the constitution and the legislation enable them to protect their interests, especially in the field of cultural articulation and creativity. Slovene cultural, communication, and media space is quite open and, for example, offers numerous possibilities for the flow of information in foreign languages via cable television networks.

The Slovene minorities in neighbouring countries have a substantially lower legal status. Bilingualism is a more sporadic phenomenon linked to settlements with a larger proportion of the minority Slovene population. Representation in government is not guaranteed. Cultural life and the media are indeed financed, but far from completely. The media, especially the electronic media including the broadcast of Slovene programming in the minority area, is substantially more modest, to a much larger degree subject to the laws of the market laws, and due to the pattern of settlement, largely inaccessible. In spite of limitations, minority education works well, especially secondary education. The actual situation of the Slovene minority is still not too bad. The somewhat larger Slovene communities, especially in Italy and Austria, enable a strong institutionalized network of political, cultural, and business associations that allow the members of the minorities to carry out important functions in the border areas. The ethnic diversity of the population of Slovenia and the bordering areas of neighbouring countries, especially in the period of the open border, has contributed significantly to solving the regional problems of peripheral areas.

The role of minorities in the open European space

In the period of classical development of the European nation-states in the 19th and 20th centuries, ethnic minorities were an undesired phenomenon, especially in peripheral areas. Territories acquired militarily or diplomatically were often populated by members of minorities that the authorities tried to get rid of in various ways or at least greatly reduce their size. Although specific protection of minorities already existed, the effect of this protection was very modest. Borders were guarded, and minorities were always subject to assimilation efforts. Although the negative attitude toward ethnic minorities persisted even in the developed and democratic countries of Europe, in general the awareness of the importance and role of the minorities in border areas changed substantially. On the declarative level – but unfortunately not much more than that – great attention was devoted to the minorities while the granting and implementation of special rights for the members of ethnic minorities remained an internal matter of countries and the subject of bilateral intergovernmental relations.

With the opening of borders and increased cross-border cooperation, the minorities gained some very real opportunities. Because members of the minorities are usually bilingual, are familiar with the legal and economic systems, the habits, mentality, and various peculiarities of both countries, and can easily establish contacts on both sides of the border, they soon proved to be not only the bearers but also the initiators of cross-border cooperation. Thus, Slovenia's western border with Italy, after the adoption and ratification of the Osim Agreement that allowed the border population to cross the border more frequently and to develop various forms of economic activity, became one of the most dynamic border regions with a high frequency of border crossings and numerous economic consequences. The border area ceased to be a peripheral region as the cooperation that began in the fields of politics and culture continued in the economic sphere. Agricultural production sought new market routes and methods of marketing and improved the technology of production. Industrial companies looked for optimal locations, which led to cooperation in the field of large and small industrial production. Huge progress was recorded especially in commerce (cross-border shopping on a massive scale) and later the commercial network and services in general expanded. On the Slovene side, a number of service companies and the entertainment industry with a chain of casinos were established on the basis of the heavy cross-border traffic. These were followed by insurance companies and a great upswing in banking, even though Slovenes in Italy already had considerable economic power because of banking. Carinthian Slovenes similarly developed strong small businesses, cooperatives, and also the banking sector. In the countryside, agriculture also plays an important role. Members of the Slovene minorities and to a somewhat lesser extent the Italians in Slovene Istria thus contributed significantly to the presence of Austrian and Italian companies in Slovenia. Today, the expansion of companies that have established themselves in Slovenia into other countries of southeastern Europe are in the foreground of interest, and in this context the minorities are seen in the role of bridge.

Pursuing their plans for expansion, these companies are already recruiting residents of Slovenia originally from the countries of the former Yugoslavia who know in detail how to do business in these areas and have contacts with relatives, friends, and other people there. Most of the second generation, the descendants of these immigrants, also have suitable qualifications and can undertake even the most demanding negotiations. The Slovene population as well has enough experience to undertake similar functions due to the experience of at least three or four generations who lived in the former Yugoslavia.

The unified European economic space, including to an ever larger degree its communications space, is becoming increasingly recognized and uniform due to the increasing mobility of the population and the unification of standards and norms and is therefore ready for establishing contacts Having people with good local knowledge will soon no longer be necessary, and bridges will be established without them. In this context we encounter the crucial question: where will the opportunities for the members of the minorities be and what will be their role? Undoubtedly, the unhindered cross-border flow of information, activities, services, and goods will strengthen communication of minorities with areas of their »parent« nations. Undoubtedly, new horizons and searches for social and spatial functions will open in the peripheral (contact) areas, as will questions of ethnic development for both the minorities and the larger entities.

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SETTLING AND SETTLEMENTS

Drago Kladnik

Population density

From a global view, Slovenia is relatively evenly settled because cores of population are dispersed throughout its territory. However, a more detailed survey indicates that due to its great landscape diversity, the population density is uneven (Figure 1).

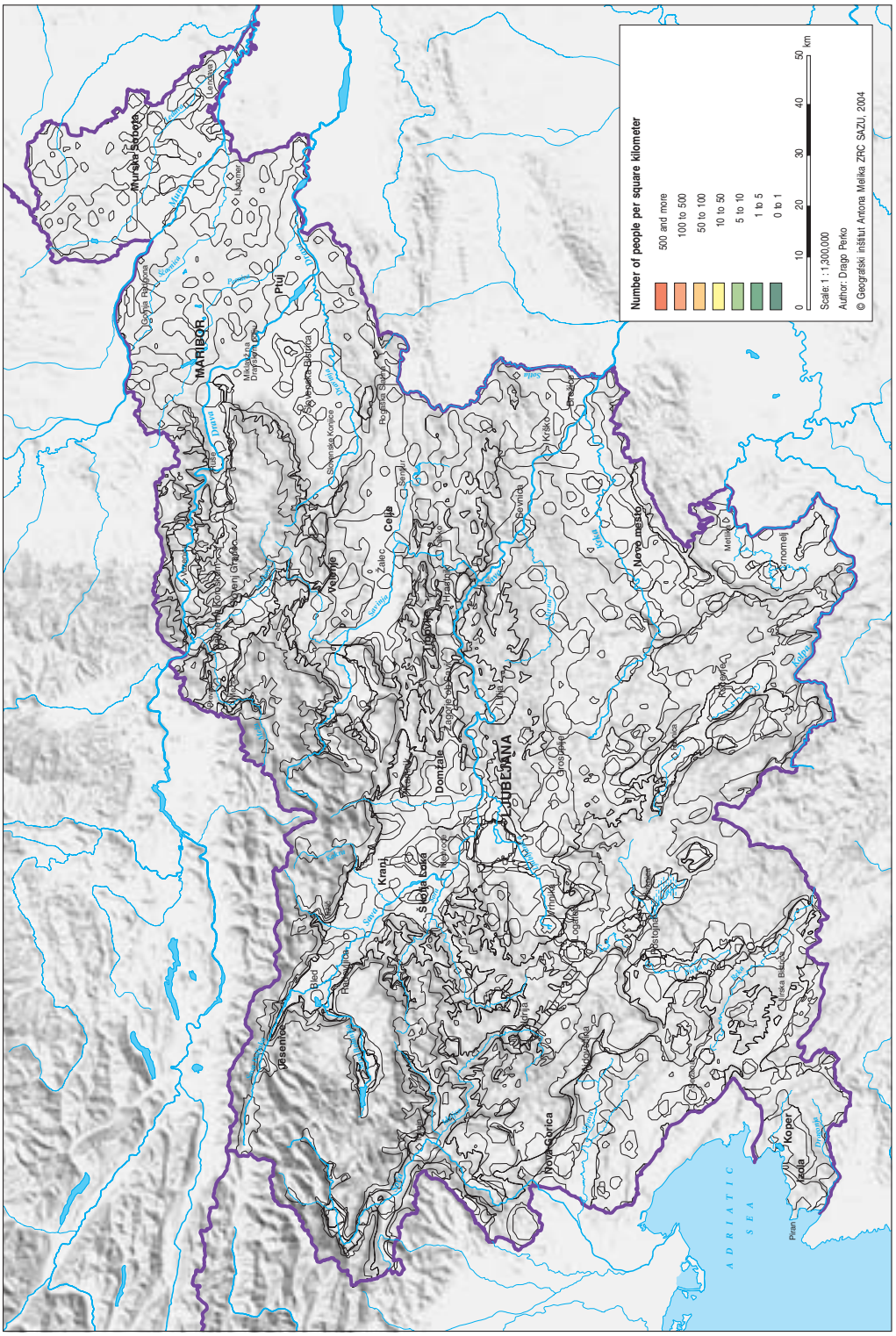
The average population density is 98 people per km^2 (Pannonian region 128 people per km^2, Alpine region 108, Mediterranean region 106, and Dinaric region 54), which ranks Slovenia among countries with a medium density of settling. A sixth of the country has an above-average population density, mostly in altitude belts below 400 meters where four fifths of the population lives or in the areas around Slovenia's largest settlements, which are mostly on the plains and along the shoreline of the Bay of Trieste. On the plains, the density is almost 500 people per km^2, in the hill regions about 100, in the medium-high mountain regions about 50, and in the mountains about 25 (Perko 1998). In the hundred-meter belt between 0 and 100 meters live 426 people per km^2, and between 1,000 and 1,100 meters only 5. Rough estimates indicate that almost a tenth of Slovenia is unpopulated (Kokole Vl., Kokole Ve., 1998)

Characteristics of the settlement pattern

Man settled the mountain areas of Slovenia as high as cereals can still successfully be grown. There are nineteen settlements above 1,000 meters, where around 1,600 people still lived in 1991. Above the limit of permanent settling, in otherwise unpopulated forest areas and occasionally even above the upper tree line, there are areas of periodic settlements including traditional summer dairy farms, forestry operations, glassworks, and modern tourist settlements. Among periodic settlements also belong the settlements of vineyard cottages characteristic of the winegrowing areas of eastern and northeastern Slovenia. Recently, people have settled permanently in parts of these settlements. Owners or buyers from the cities have also converted numerous vineyard cottages into vacation homes. Some larger colonies of vacation homes have grown on attractive locations, either alongside existing settlements or completely separate on their own.

A great dispersion of settlements is characteristic of Slovenia. On average, there are about thirty settlements for every 100 km^2, and therefore the distances separating them are relatively small. Just under two million people are distributed in almost six thousand settlements, about seventy of which are towns or cities. Only thirty-seven of these have more than 5,000 inhabitants, sixteen have more than 10.000, seven have more than 20,000, and only the two largest cities, Ljubljana and Maribor, have more than 100,000 inhabitants. Only a good half of the population lives in cities.

The cities are encircled by 280 settlements in the immediate suburban vicinity and then another 660 very urbanized suburban settlements; more than 400,000 people live in these two groups of settlements. The next circle comprises urbanized and semi-urbanized rural settlements. Their number totals 965, and 300,000 people live in them. The remaining 350,000 people live in just under 4,000 rural settlements.


Number of people per square kilometer
500 and more
100 to 500
50 to 100
10 to 50
5 to 10
1 to 5
0 to 1
0
10
20
30
40
50 km
Scale: 1 : 1,300,000
Author: Drago Perko
© Geografski inštitut Antona Melika ZRC SAZU, 2004
Murska Sobota
MARIBOR
Ptuj
Celje
Velenje
Nova mesta
LJUBLJANA
Kranj
Jesenice
Nova Gorica
Koper
Izola
Piran
ADRIATIC SEA

◄ *Figure 1: Population Density in 1991.*

Table 1. Size of settlements in Slovenia according to population in 1996.

Size class (number of inhabitants)	Number of settlements	Number of inhabitants	Proportion of settlements in %	Proportion of inhabitants in %	Average size of settlement (in population)
up to 20	561	6,823	9.6	0.3	12
21 to 50	1,035	36,140	17.2	1.8	35
51 to 100	1,318	96,720	22.5	4.9	73
101 to 200	1,364	195,662	23.3	9.9	143
201 to 500	1,093	335,221	18.7	17.0	307
501 to 1,000	290	198,447	5.0	10.1	684
1001 to 2,000	105	146,170	1.8	7.4	1,392
2001 to 5,000	43	172,803	0.7	8.8	4,019
5001 to 10,000	21	139,210	0.4	7.1	6,629
10.001 to 20,000	9	128,530	0.2	6.5	14,281
20.001 to 50,000	5	150,544	0.1	7.6	30,109
50.001 to 100,000	1	98,811	0.0	5.0	98,811
More than 100,000	1	263,033	0.0	13.4	263,033
Total	5,846	1,968,114	100.0	100.0	337

Source: Kokole Vl., Kokole Ve., 1998.

Forms and types of settlements

The dominant economic activity, the natural conditions, the characteristics of colonization, and the cultural environment determined the form and type of settlements, which is why settlements in different regions differ substantially from one another. The majority of Slovene settlements were created in the period when agriculture was the fundamental activity, which is reflected by their location and pattern of development (Drozg 1995).

It is characteristic of solitary farms to stand alone and distant from each other, so there are no functional connections among them. An intermediate stage between the solitary farm and the consolidated settlement is the hamlet, which can also be a smaller part of a settlement that is spatially separated from the core. It is composed of only few farm households and does not have the formed center that is characteristic of consolidated settlements.

In dispersed settlements, the farmhouses are scattered over a larger area. The settlement is therefore not clustered because there are pieces of farm land between houses. The houses are arranged on the tops of ridges, and more rarely distributed along the margins of valleys or on hillslopes.

The most widespread are consolidated settlements that can be either nucleate or roadside types. The types of nucleate settlements include the following (Drozg 1998):

- Settlements of the alpine type built in a compact fashion where the buildings stand individually and are arranged in a group. Their positions are oriented in different directions, meaning that the orientation of one building does not match the orientation of its neighbour. The traffic network is very branched, and there are many side roads and field tracks.

Figure 2: Isolated farmsteads in a clearing in the Pohorje mountain range (photography Jurij Senegačnik).

- Settlements of the subalpine or Central-Slovenia type with a central road along which buildings are arranged in groups. Some buildings border the road with their longer sides, and others with their shorter sides. The buildings stand individually. The roads are substantially less branched in comparison with the previous settlement type.
- Settlements of the karst type with buildings joined in groups or »islands« of buildings that comprise a farm built around a central courtyard. These »islands« of buildings are arranged in clusters throughout the settlement, but the density of build-up is not high. The road network is very branched and dense, and there are many intersections and dead-end streets.
- Settlements of the littoral type where the buildings are attached to one another to form a relatively straight row. Rows of buildings spread divergently through the settlements in various directions, and therefore the traffic network is very branched. Characteristic of it are a uniform lengthwise and crosswise profile of streets and a compact pattern of development.

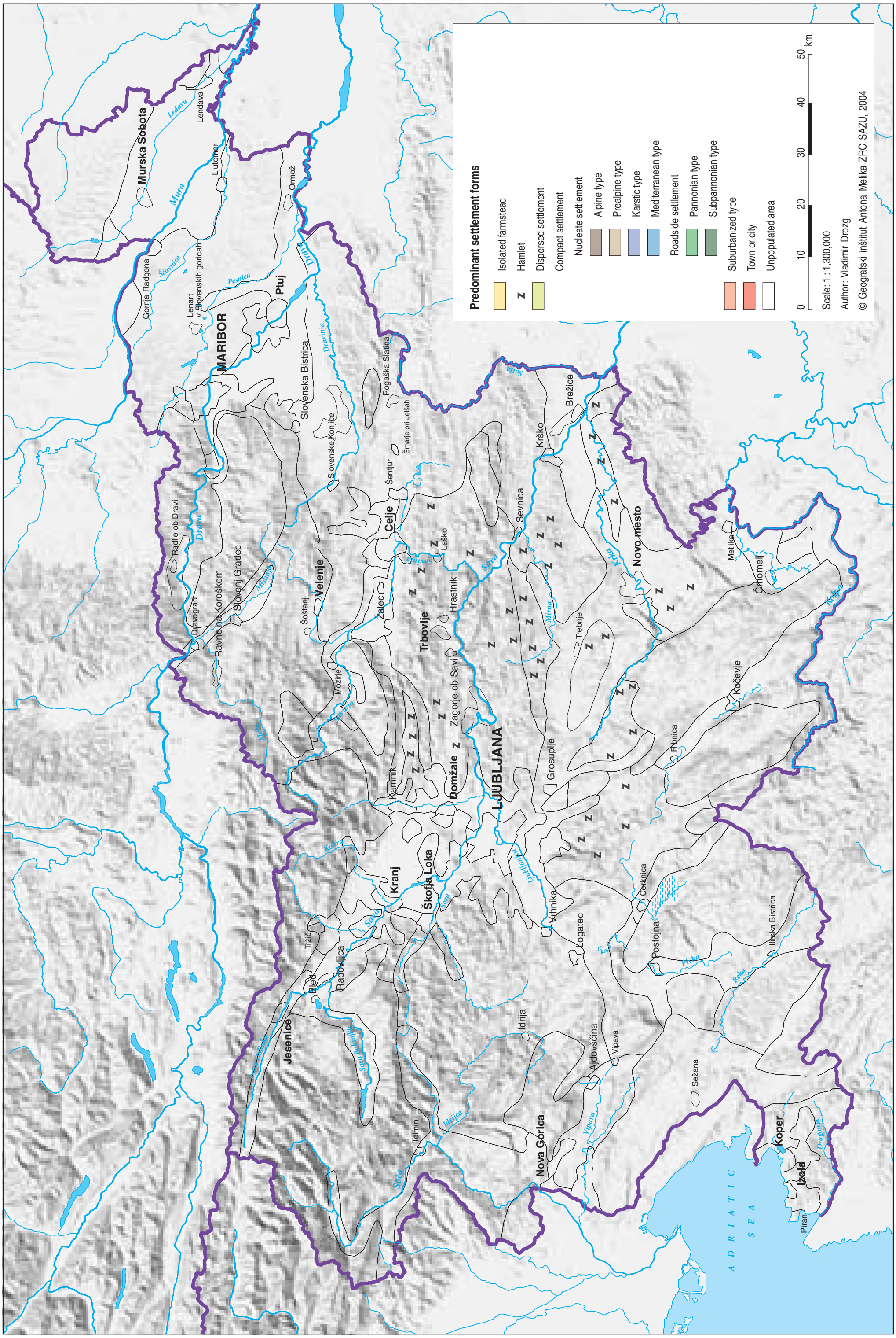
Roadside settlements are of two types:

- In settlements of the Pannonian type, the distance between buildings is uniform, the buildings are oriented in the same direction, and they follow one another in a row. They are arranged along one or both sides of the road, but they do not border it and stand equally distant from it. Characteristic of this settlement type is very branched traffic network with circular roads, and hence there are numerous intersections in these settlements; imposing trees often grow alongside the roads and roadside shrines are set up.
- Settlements of the subpannonian type are similar to the previous type. The buildings are also arranged in a row, but there is only one road. There are frequently buildings on both sides of the road, which the buildings do not border and to which their distance varies.

Suburbanized settlements are characteristic of the modern settlement pattern. These are characterized by a linear traffic network and an arrangement of buildings that is neither a group nor a row. Buildings stand individually in the middle of a lot, equidistant from one another and facing the same direction. The traffic network is composed of primary collecting roads, side roads, and access roads.

The characteristic types of settlements spread over large consolidated areas, while individual types are only found in some regions (Figure 4). Suburbanized settlements are exceptional because they do

Figure 3: Nucleate settlement of Šmartno in Goriška brda (photography Marjan Garbajs).


Predominant settlement forms
Isolated farmstead
Hamlet
Dispersed settlement
Compact settlement
Nucleate settlement
Alpine type
Prealpine type
Karstic type
Mediterranean type
Roadside settlement
Pannonian type
Subpannonian type
Suburbanized type
Town or city
Unpopulated area
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Vladimir Drozg
© Geografski inštitut Antona Melika ZRC SAZU, 2004
LJUBLJANA
MARIBOR
Murska Sobota
Ptuj
Celje
Velenje
Kranj
Škofja Loka
Novo mesto
Koper
Izola
Piran
Nova Gorica
Jesenice
Trbovlje
Domžale
ADRIATIC SEA

◄ *Figure 4: Settlement forms.*

not have specifically regional characteristics. The classification of settlement types roughly corresponds to natural-geographical and cultural-historical areas. The following connections are noticeable:

- In the high mountains and subalpine hills (the higher parts of the Julian Alps, the Karavanke Mountains, and the Kamniške-Savinjske Alps, the upper part of the Soča Valley, the higher parts of the Pohorje mountain range, the Cerkljansko hills, the Škofja Loka hills, the Polhov Gradec hills, and the Posavsko hills), isolated farmsteads and nucleate settlements of the alpine and subalpine type dominate;
- In lower parts of mountains, hilly regions, and the karst valley systems stand hamlets (mostly in Dolenjska, the hilly areas of Primorska, and Pannonian Slovenia), dispersed settlements (Slovenske gorice, Haloze, Goričko, and Kozjansko), consolidated settlements of the alpine type (Gorenjska, Savinja Valley, Notranjska, the Pivka valley system, and the lower parts of the Posavsko hills, Škofja Loka Hills, Cerkljansko Hills) and the subalpine type (Dolenjska, southern part of the Posavsko Hills, partly Notranjska), the karst type (Kras), and the littoral type (Vipava valley, Goriška Brda, Vipavska Brda, and Koprska Brda);
- The plains, wide valleys, and gravel flood plains are dominated by consolidated settlements of the subalpine type (Celje basin, the Drava valley, also Gorenjska, Ljubljana basin and Dolenjska), the Pannonian type (Prekmurje, Mursko polje, and Bela krajina), and the subpannonian type (Dravsko polje and Ptujsko polje, the Krško basin and Posotelje, the Ščavnica and Pesnica valleys, and the eastern margin of the Celje basin).

Smallness, the main feature of Slovenia's cities, is also reflected by their modest morphological development. According to the type of ground plan and the level of its formation, the cities can be divided into seven characteristic types (Drozg 1998):

- Cities with formed medieval, classicist, and modernist ground plans,
- Cities with formed medieval and modernist ground plans and unformed classicist ground plans,

Figure 5: Roadside settlement of Dragonja vas in Dravsko polje (photography Jože Hanc).

Figure 6: Medieval centre of Ljubljana (photography Jurij Senegačnik).

- Cities with formed medieval and modernist ground plans,
- Cities with unformed medieval and formed modernist ground plans,
- Cities with unformed medieval and modernist ground plans,
- Cities with formed medieval ground plans, and
- Cities with formed modernist ground plans.

The higher the city ranks in the system of central settlements, the more complet its ground plan is. Only Ljubljana, Maribor, and Celje have formed ground plans from all the periods of construction history; otherwise, cities with only two formed ground plans, the medieval and the modernist, dominate. In some regional centers, for example, Kranj, Izola, Novo mesto, and Ptuj, only the embryos of a classicist ground plan exist. Many cities grew from modest medieval towns into industrial centers, which is why they have an unformed medieval ground plan and a formed modernist ground plan. The majority of rural towns have a formed medieval ground plan, and even though modest, it gives them a characteristic appearance.

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THE NETWORK OF SETTLEMENTS AND THE DEVELOPMENT OF URBANIZATION IN SLOVENIA AT THE START OF THE 21ST CENTURY

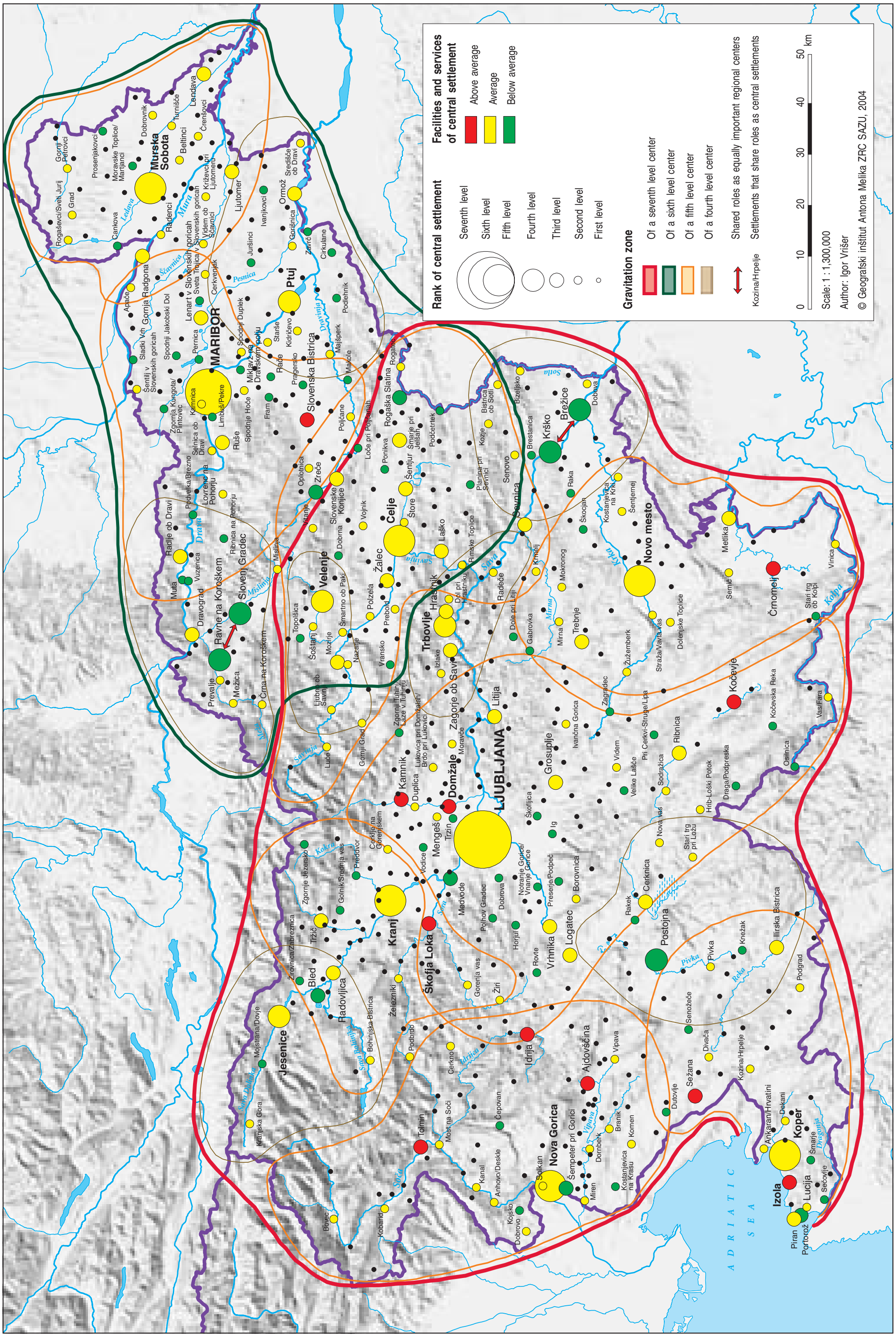
Marjan Ravbar

A look at the map below shows that according to European »standards« Slovenia's urban system is relatively unrecognizable as such since only the Ljubljana region exceeds half a million inhabitants, the Maribor region is smaller by half, the Celje region is smaller by half than Maribor, the conglomeration of coastal cities is again smaller by half than Celje, and the remaining urban areas number less than 50,000 people. In spite of this, a change in the spatial relationships with the neighbouring countries of the European Union, especially with cities in Friuli-Venezia Giulia (Italy) and Carinthia and Styria (Austria) is to be expected in the coming decades when borders will no longer present an obstacle. In accordance with its geopolitical position, Slovenia's urban network will become a part of globalization trends, which are marked by (propulsive) production and service activities that have an increasingly supra-national character, even though they usually have an »individualist« approach relative to spatial planning. Globalization will increase competition between large economic regions, especially between the cities or urban regions that are the »motors« of regional development. The position, development, and role of the cities in the hierarchy will change in conditions of world competition. Development will increasingly depend on inclusion in the network of European economies. It is important for the Slovene urban system that it lies relatively close to European development axes or their development focal points, so it can be connected via the so-called »quick connections.« Since an appropriate infrastructure is one of the more important modern location factors, swiftness of decision is just as important. In this role, cities as development generators are important because of the development of public functions. These centers develop new network forms of economic, financial, research, educational, social, public, and service activities, etc., which thus became the bearers of development impulses. In global processes, network forms usually appear in the flexibility of production (for example by forming »technology parks«), the labour market (for example, in the polarization and hierarchization of employment centers), the mobility of capital, the deregulation of inherited political, institutional, and tax mechanisms, and the injection of equity capital in the spectrum of public and social spheres.

Conditions and modern problems in the development of cities: urban development between the rise and decline of the importance of urban centers

Social developments in recent decades contributed to the fact that cities as a spatial phenomenon can no longer be defined as a separate process because their boundaries with the countryside are increasingly blurred and the cities are increasingly being transformed into unified urban regions. Furthermore, a hierarchical urban system is gradually replacing the horizontally planned network of cities. Polarization and specialization are the main characteristics of the current and future structure of cities. Continuing transformation, primarily in cities within the borders of the European Union, is to be expected, while areas outside the so-called »interior« boundaries are expected to lose their importance.

Regardless of their insignificance in comparison with the size of other European cities, it is indisputable that along with their economic influence, important cultural and social impulses emanate from Slovene cities. Two contradictory processes are characteristic of their further spatial development: demographic and settlement growth »outward« with the transformation of predominantly agrarian land into mixed (agricultural-urban) land use areas and growth »inward« with the change of income-extensive


Rank of central settlement
Seventh level
Sixth level
Fifth level
Fourth level
Third level
Second level
First level
Facilities and services of central settlement
Above average
Average
Below average
Gravitation zone
Of a seventh level center
Of a sixth level center
Of a fifth level center
Of a fourth level center
Shared roles as equally important regional centers
Kozina/Hrpelje
Settlements that share roles as central settlements
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Igor Vrišer
© Geografski inštitut Antona Melika ZRC SAZU, 2004

◄ *Figure 1: Urbanization in 1996.*

uses to income-intensive uses. In market economies, activities in city centers that do not create enough income per surface unit to cover all expenses, including city costs cannot survive. On abandoned (predominantly) industrial surfaces close to city centers, new commercial and business centers are developing that can cover the increasing urban costs through more intensive land use. Non-profit public (including administrative) activities that remain in central locations in contradiction to market laws must be subsidized by the state if they wish to remain in the more accessible locations.

The continuation of current urbanization trends is undoubtedly an unavoidable law of development that in spite of everything still demands the re-evaluation of the characteristics and comparable advantages of the existing urban system. This system is the fruit of a long policy of stimulating polycentric development and its continuation for directing the mixed use of land in terms of dispersed concentrations and modern forms of urbanization with assessments of the available »reurbanization« potential. In this sense, the following strategies for directing the development of cities often apply:

- »consolidation« of cities as a strategy of preserving and protecting usable buildings with the possibility of renovating the city fabric and preserving quality city neighbourhoods, suburban centers, newly suburbanized surrounding areas, village centers, etc.;
- revitalization as a strategy of urban renewal and the further construction of cities based on this concept linked to the gradual restructuring of areas where the new use is also based on a denser structure of housing and employment possibilities;
- sanitation as a strategy of introducing the new use of deteriorating industrial areas and areas of public infrastructure primarily for the construction of residential neighbourhoods;
- expansion of the cities and suburbs by more consolidated building (concentrations within already built-up areas) in otherwise limited potential building land (Koželj 2001) employing concepts of mixed land use (Ravbar 2002).

For the balanced spatial development of the cities, it is important from the national viewpoint that economic development increases the attractiveness of the functional area and consequently improves the quality of life. Along with this, in spite of the heterogeneity of function areas and their size, it is necessary to strive for the decentralized basis of the network of cities with a complementary activity structure. Last but not least, cities will continue to develop beyond their existing boundaries even though their further spatial expansion is unjustified for environmental and economic reasons. In future, it will be necessary of exploit the existing potentials for building concentrations within existing settlement areas. From the prospective viewpoint, two possible models confront each other:

- the classic model of a centralized urban network based on the consolidation of the polycentric and hierarchical based system of central places, and
- the model of a decentralized network of various development focal points in a region based on modern principles of a »shallow« hierarchical network of relations or dispersed development poles around infrastructural focal points (Ravbar et al. 2001).

Three decades of endeavours to apply the polycentric system of a network of settlements and modern socioeconomic processes exclude the realization of a centralized urban network of settlements in Slovenia. The origins of the formation of urban regions offer diverse developmental challenges that are the consequence of various complementary reciprocal forms and developmental levels of urbanization. The model of a »shallow« and decentralized network of satellite cities within functionally and gravitationally linked urban regions, which is based on modern principles of the network connection of developmental poles, is therefore more realistic for Slovenia and in harmony with modern aspirations for its socioeconomic and demographic development. This dictates the re-evaluation of the existing development strategies that should be based on the consideration of the specific needs of urban areas in the framework of national development orientations, accelerating the horizontal and vertical connections between national, regional, and local administrations, and closer links with the network of

cities in the European Union, which requires the establishment of a system of information on the special features of Slovenia's urban system and its vulnerabilities.

Modern cities are therefore gradually changing from a hierarchical system of settlements into a more equalized network of focal points according to the principal of dispersed decentralization or into urban regions. Their further development places in the foreground a policy of regional development based on the following general objectives:

- the balanced polycentric development of the network of cities by forming new relations with the countryside in a unified urban system;
- the formation of networks in accordance with the increasing specialization and division of labour that together create conditions for the elimination of too large structural differences on the margins of urban areas and between regions;
- the connection of networks of different levels by combining national, regional, and local connectedness with effective traffic connections among otherwise autonomous units;
- settlement development oriented »inward«;
- equitable access to goods and services of common importance through a modern infrastructure and the reduction of dependence on the automobile by encouraging the use of public transport and alternative forms of individual transport (e. g., bicycling);
- the improvement of environmental conditions by decreasing traffic flows, encouragement of intermodal systems of all types, and coordinated construction of the transportation and information infrastructure.

Modern postindustrial cities can only be successfully restructured on the regional scale, and they must have a suitable (economically-justifiable) gravitational hinterland. The principal characteristic of an urban region is its »internal« polycentricity. In multi-pole urban regions, individual centers specialize according to local advantages and potentials, although there is not a precisely determined hierarchy among them. Thus the importance or the role of individual centers in a region changes over time. The more diverse and complementary the structure of its work places is, the more connected its economic activities are. It is worth pointing out that potentially fewer risks appear in urbanized areas that are spatially linked in a network than with activities that are only connected functionally. In the case of Slovenia, this concerns the network of cities that are (too) small and not linked in a uniform urban system. Another »weakness« of Slovenia's small cities is that their number is high relative to their total population and that they are located relatively close to each other. We believe that modern location conditions will trigger further differentiation in the hierarchical level of centers based on the activation of modern development potentials.

Given that settlement structures reflect the diversity of historical, social, cultural, and economic functions and that on this basis crystallization cores formed in certain areas, a five-level scheme of a network of centers as the basis for polycentric regional development is optimal in Slovene conditions, based on the achieved level of economic development: (1) international level of functions, (2) national level of functions, (3) regional level of functions, (4) intermunicipal level of functions, and (5) local level of functions.

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LAND USE IN SLOVENIA

Franci Petek

In its widest meaning, land use marks and defines human activity in the landscape. The characteristics of natural elements as well as the sociogeographical factors of a landscape are reflected in the distribution of categories of land use.

The study of land use has a long tradition in Slovene geography. In the framework of agrarian geography and the geography of the countryside, land use was studied intensively in the middle of the 20th century by Ilešič (1950, 1971) in connection with research into the distribution of cultivated fields and by Medved (1969, 1974) and Klemenčič (1972) in connection with the transformation of agriculture and of the countryside in general. In the last few years, due to major social changes, land use is again under study in Slovene geography (Gabrovec and Kladnik 1997 and 2001; Gabrovec, Kladnik, Petek 2001; Petek 2002; Urbanc 2002; Kladnik and Ravbar 2003; Hrvatin and Perko 2003).

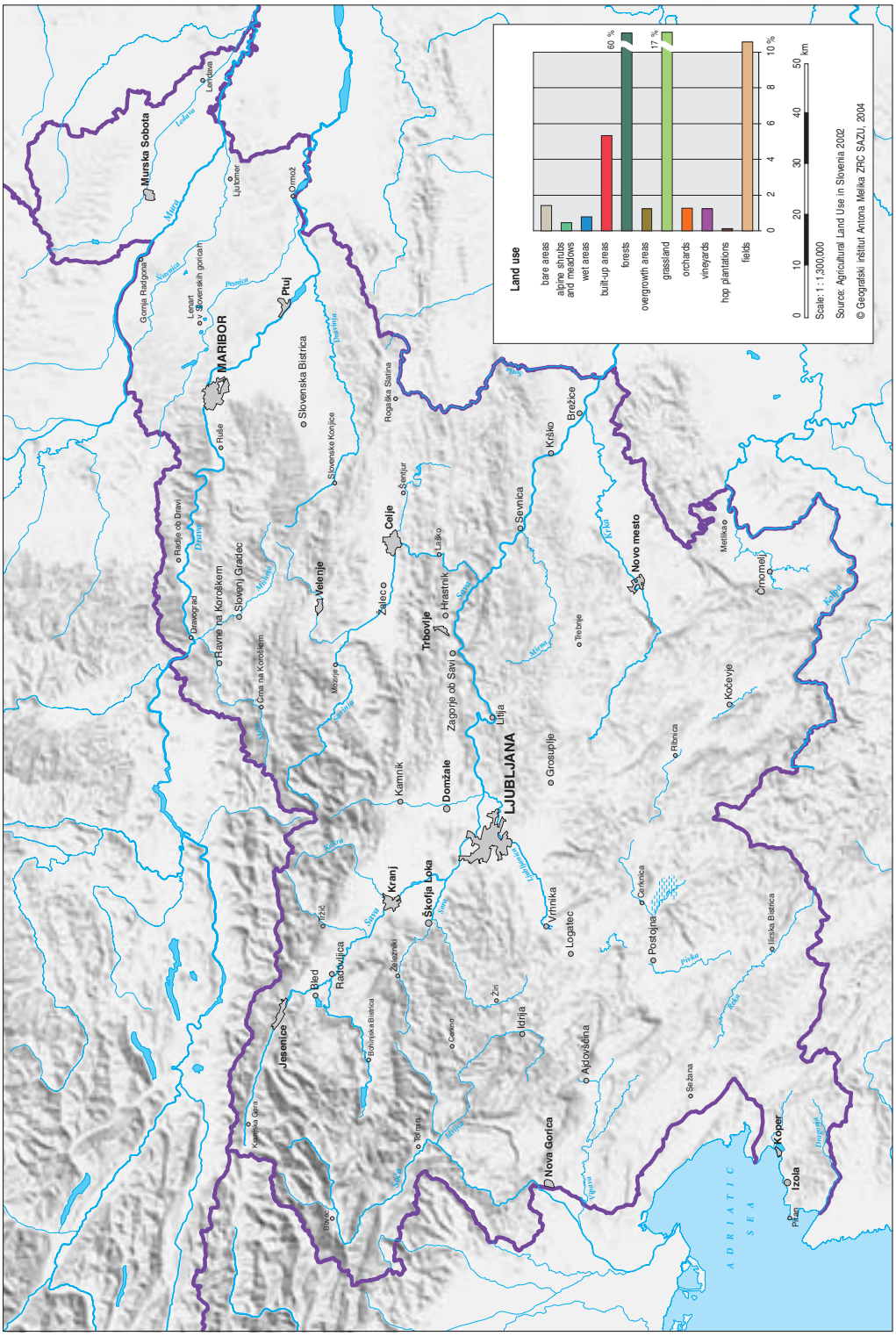
Basic source for the study of land use is the data of the land cadastre. The first stable land cadastre in the territory of Slovenia was the so-called Franciscan Cadastre (1822–1828), which was established in the first half of the 19th century. Using the data from the land cadastre, Slovene geographers can therefore study the changes in land use in the last two centuries and their connection with the changes in sociogeographical factors. The Franciscan Cadastre differentiated five basic land use categories: cultivated fields and gardens, vineyards, meadows, pastures and alpine meadows, and forests. The modern land cadastre adds orchards to these basic categories. In Slovenia, there are more than five million parcels and 2,696 cadastral municipalities. Due to the slow recording of changes in the cadastre, the data lags behind the actual land use situation in the landscape.

With ever greater availability and usability of satellite and aerial photographs, numerous maps of land use were created for various purposes in the last decade that illustrates as closely as possible the actual situation when the data was collected.

At the Statistical Office of the Republic of Slovenia, the first map of actual land use for all of Slovenia was elaborated in 1993 by combining satellite-scanned data, outlines of forest areas made on the basis of aerial photographs, outlines of waters, the 100-meter digital relief model, data on roads and of housing coordinates, and other necessary data. This map had a number of deficiencies, but the upgraded version from 2001 is already more precise and therefore much more useful. (Statistical GIS of Land Cover of Slovenia 2003).

In 2003, the Environmental Agency of the Republic of Slovenia elaborated the CORINE Land Cover (2004) map for Slovenia. This database was created on the basis of satellite photographs from 2000 and according to methodology of data collection is comparable with the databases of twenty-nine other European countries. Due to great relief diversity and the fragmented land and property structure of the surface of Slovenia, the actual situation of agricultural land use in this base is somewhat blurred.

The most detailed study of land use is offered by the map of actual land use that originated in the framework of the Project of Modernization of Registration of Real Estate or its subproject Collecting Data and Monitoring the Use of Agricultural Land, which the Ministry of Agriculture, Forestry, and Food of the Republic of Slovenia took primary responsibility for coordinating. Digital 1:5000-scale orthophoto maps based on black-and-white aerial photographs taken between 1996 and 2001 were the source of data for this map of actual land use. However, the different times the data was collected also poses the greatest weakness of this map. In 2002, all the interpreted orthophoto maps were combined in one map of actual land use (Rotter 2001; Agricultural Land Use in Slovenia/Raba kmetijskih zemljišč 2002). We used the digital form of this source to illustrate the land use situation in Slovenia.


Land use
bare areas
alpine shrubs and meadows
wet areas
built-up areas
forests
overgrowth areas
grassland
orchards
vineyards
hop plantations
fields
60 %
17 %
0 2 4 6 8 10 %
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Source: Agricultural Land Use in Slovenia 2002
© Geografski inštitut Antona Melika ZRC SAZU, 2004
Murska Sobota
Lendava
Ljutomer
Ormož
Ptuj
MARIBOR
Ruše
Slovenska Bistrica
Slovenske Konjice
Rogaška Slatina
Šentjur
Celje
Laško
Brežice
Krško
Sevnica
Radlje ob Dravi
Dravograd
Slovenj Gradec
Ravne na Koroškem
Črna na Koroškem
Velenje
Žalec
Hrastnik
Trbovlje
Zagorje ob Savi
Litija
Trebnje
Novo mesto
Metlika
Črnomelj
Kočevje
Ribnica
Grosuplje
LJUBLJANA
Domžale
Kamnik
Kranj
Škofja Loka
Vrhnika
Logatec
Cerknica
Postojna
Ilirska Bistrica
Jesenice
Bled
Radovljica
Tržič
Železniki
Žiri
Idrija
Cerkno
Ajdovščina
Sežana
Nova Gorica
Tolmin
Bovec
Kranjska Gora
Koper
Izola
Piran
ADRIATIC SEA

◄ *Figure 1: Types of land use in Slovenia.*

The basic map of actual land use differentiates twenty-one categories, but for the sake of presentation we logically combined these into twelve categories. In comparison with the categories of land use mentioned the with land cadastre, this source also distinguishes several other different categories. It differentiates between intensive and extensive meadows, which due to the problem of distinguishing these two categories were united into one category designated »grassland.« This category is comparable to the meadows and pastures of the land cadastre. Among permanent plantations, along with vineyards and orchards are also olive groves, and specially separated is land in overgrowth, which includes primarily abandoned meadows and pastures in the process of afforestation. On the original map, mistakes in classifications occurred for individual smaller areas of Slovenia, which have been partly corrected for this presentation.

Based on the processing of land use categories (Agricultural Land Use in Slovenia 2002) in the Geographical Information System, Slovenia has 60.3% forest, 17.7% grassland, 10.2% cultivated fields, 5.3% built-up area, 1.4% rock surface, 1.2% each of vineyards, orchards, and land in overgrowth, 0.8% water areas and wetlands together, 0.5% heather and mountain meadow together above the upper tree line, and only 0.1% each of olive groves and hop plantations.

Forests therefore strongly dominate and today Slovenia ranks among the most forested countries in Europe. However, land categories are not evenly distributed throughout Slovenia. Their distribution is defined to a great extent by relief elements (inclination, altitude, and exposition) as well as by climate and soil conditions. Cultivated fields, for example, greatly dominate the Pannonian plains where they occupy some 52% of the surface and the alpine plains where they occupy a good quarter. On the other hand, in the alpine mountains cultivated fields occupy only 0.5% of the surface and on the Dinaric plateaus just 1.5%. Hop plantations only appear in the Savinja plain, while vineyards and orchards occur mostly in the Mediterranean and Pannonian hills. Forests overgrow as much as 81% of the Dinaric plateaus but only one fifth of the surface of the Pannonian plains. Population and economic activity present the greatest pressure on plains, above all in the alpine region, and therefore just under 18% of the surface of these areas is built up. Heather and mountain meadows (2.8%) and rock surfaces (9.1%) are significant land categories in the alpine mountains, the only Slovene region with land above the upper tree line.

Land use is a dynamic landscape element. Changes in sociogeographical factors are reflected in changes of land use. Between 1950 and 1970, grassing over dominated in Slovenia (Medved 1970), mostly the conversion of cultivated fields into meadows. After 1970, afforestation dominated, the spontaneous change of other land categories into forest. In general, it is characteristic of Slovenia that between 1900

Table 1: Proportion of major types of land use in Slovenia in 1900, 1953, and 2000.

	Cultivated fields, gardens, and hop plantations (%)	Vineyards (%)	Meadows, pastures, and orchards (%)	Forests (%)
1900	18.6	2.3	33.3	40.9
1953	17.8	1.6	33.0	42.2
2000	10.3	1.2	20.1	60.3

1900: Leksikon občin za Avstrijsko-Ilirsko Primorje (1906), Kranjsko (1906), Štajerska (1904), Koroško (1905); Mezögazdasági statisztikája 1897 za Prekmurje.
1953: Land Cadaster/Zemljiški kataster.
2000: Agricultural Land Use in Slovenia/Raba kmetijskih zemljišč 2002.

and 2000 the proportion of agricultural land categories (cultivated fields, meadows, pastures, vineyards and other permanent plantations) decreased, while the proportion of forests and built-up areas increased. The proportion of agricultural land dropped from 54% to 32%, while the proportion of forests rose from 41% to 60%.

In the case of alpine land, we established that the changes in land use in the 19th century were mostly influenced by the change in farming techniques (shift from pasture to barn stock farming, modern rotation without fallow periods, and the introduction of new cultures), the abolition of the feudal system after 1848 and of the servitude connected with it, which increased social differences among the population, and the decline of non-agrarian sectors of the time. In the first half of the 20th century, changes in land use were influenced by economic changes, primarily the development of the first industries and the start of the deagrarianization of the Slovene population. In the second half of the 20th century, along with industrialization, the agricultural policy of the state, then burdened with Communist ideology, also influenced changes in land use. Since 1991 when Slovenia became independent and embraced a market-oriented agricultural policy, we can expect to see the further selective abandoning of farm land, which to a certain degree is already indicated by changes in land use.

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CHARACTERISTICS OF AGRICULTURE IN SLOVENIA

Tomaž Cunder

The basic characteristic of Slovenia's agriculture is that for a long time it developed in exactly the opposite direction than taken by agriculture in the majority of other European countries. This applies especially for the agrarian structure and its development. While in developed western European countries, together with the improvement of agricultural technology, the process of enlargement of farms and concentration and specialization of production were going on relatively fast, in Slovenia the exact opposite process occurred right up to the beginning of the 1990's, largely in the private sector of Slovene agriculture. This process is characterized by permanent decrease and fragmentation of the land property, by low working intensity of production and, in some areas, by gradual abandoning of production and the consequent overgrowing of farm land. Although Slovene agriculture is forced to manage in more difficult production circumstances due to the natural conditions, it is primarily socio-economic factors such as poor size and property structures of farms, the low level of professionalization, and the still relatively low work intensity, that decisively obstruct more rapid technological progress and modernization.

Natural conditions for agricultural production

Due to the distinctive dissection of the relief, Slovenia most certainly does not rank among the countries with natural assets favourable to agricultural production. On the contrary, in the European space Slovenia belongs to the circle of countries with the most unfavorable production conditions because of its diverse and mountainous relief and large proportion of karst areas. While poorer production conditions do not necessarily make agricultural production impossible, they result in the lower production capability of farms and a smaller choice of cultures and production orientations, and in general they weaken the adaptability and competitiveness of Slovene agriculture.

The quite specific and variegated structure of the use of farm land also influences the low level of adaptability of agriculture. With the exception of the flatlands of the sub-Pannonian region in the northeast and smaller consolidated areas in the bottoms of valleys and plains, Slovenia has no significant areas suitable for crop production. In spite of an advantageous geographical position that allows extensive and mostly qualitative production in fruit-growing and winegrowing, the proportion of land under permanent orchards and vineyards is much lower than in countries with similar production conditions. Some two thirds of all farm land is grassland that is poorly exploited on the average relative to the frequency and the manner of use, which is dominated by two- and three-harvest meadows, extensive pastures, and hayfields.

The significance of agriculture in the general economy

Just as in other developed countries, the significance of agriculture in the general economy is constantly decreasing in Slovenia. This is evident for all of the three indicators usually used to define the economic and social role of an activity:

- the proportion of agriculture in the total Gross Domestic Product (GDP),
- the proportion of people employed in agriculture,
- the proportion of agriculture in foreign trade exchange.

Table 1: Proportion of agriculture in GDP, employment, and trade balance in Slovenia (in %).

	1990	1995	2000
Agriculture in GDP	4.8	4.6	3.5
Employed in agriculture (registered employment)	7.0	6.4	4.8
Agriculture in total value of			
export	4.2	4.0	3.7
import	8.7	8.4	6.4

Source: Institute for Macro-economic Analyses and Development

The 3.5% proportion of the total GDP ranks Slovene agriculture on the level of the less developed countries of the European Union and, with the exception of Poland and Hungary, is comparable with other countries of Central and Eastern Europe. Compared with the European Union, Slovene agriculture produces almost 10% less GDP per hectare of farm land or 2.2 times less per employee in the agriculture sector.

The proportion of Slovenia in the international exchange of farm produce is practically negligible. It generally applies that Slovenia is net importer of food because the value of imported farm produce is almost twice the size of its export.

Production structure of Slovene agriculture

Because the natural and structural conditions in Slovenia to a large extent dictate the orientation of agriculture production, stock farming dominates with approximately 61% of the value of total agriculture production. In the framework of vegetable production, the production of field crops dominates, although the production of fruit, grapes, and wine (all together about 12%) also represents an important part of the total agricultural production.

Table 2: Structure of value of total agricultural production in Slovenia (in %).

	1990	1995	2000
Total agricultural production	100.0	100.0	100.0
Vegetable production	47.1	44.3	38.7
field crops	39.3	35.8	26.8
fruit	3.7	4.7	6.0
grapes and wine	4.1	3.8	5.9
Livestock production	52.9	55.7	61.3
beef and milk	25.5	31.9	36.7
pigs	11.5	12.2	11.2
other	15.9	11.6	13.4

Source: SURS and Institute of Agriculture of Slovenia.

The extent and structure of vegetable production is to a large degree connected with livestock production: fodder comprises almost half of the total production. Corn is the prevailing field crop, covering about 40% of cultivated land, followed by cereals (20%) and potato (10% of cultivated land). Sugar

beet and hops also represent an important part of field produce; the latter is traditionally export-oriented. The intensity of production is constantly increasing, although the average harvest still lags behind harvests in the European Union.

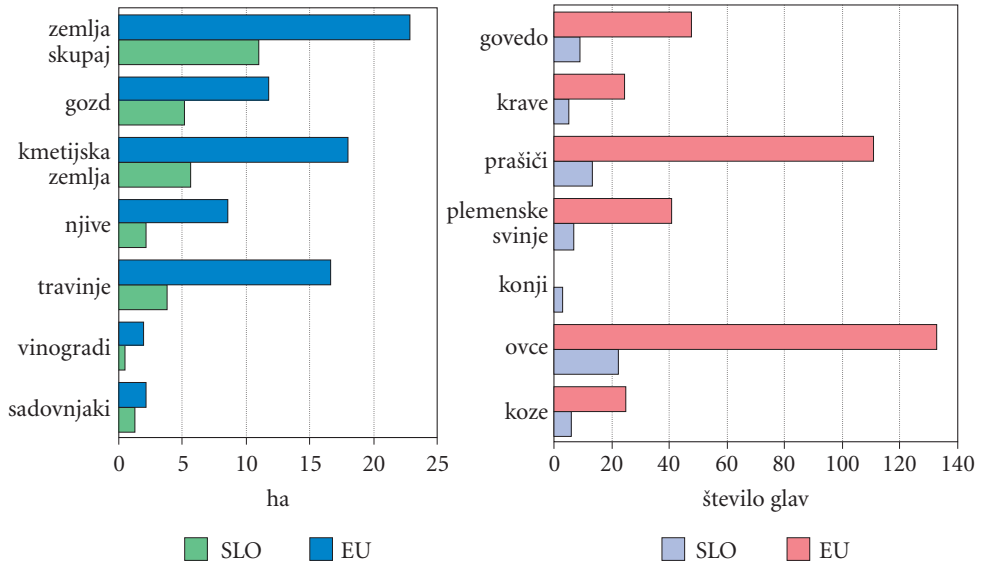
The extent of fruit production has high annual oscillations, largely due to different climate conditions. Diverse natural conditions enable the production of various types of fruit, but in general the structure of production is dominated by apples, followed by pears, peaches, sour cherries, and cherries. Annual oscillations are also evident in the production of grapes and wine, where white wine varieties account for more than 70% of the production.

In the structure of stock farming, cattle breeding dominates, mostly the combined production of milk and beef. According to the value of production pig breeding and poultry breeding follow, and recently the significance of sheep breeding and goat breeding has increased. Relative to a fall in production, important changes have become visible recently in poultry breeding, largely the result of the loss of former Yugoslav markets.

Agrarian structure

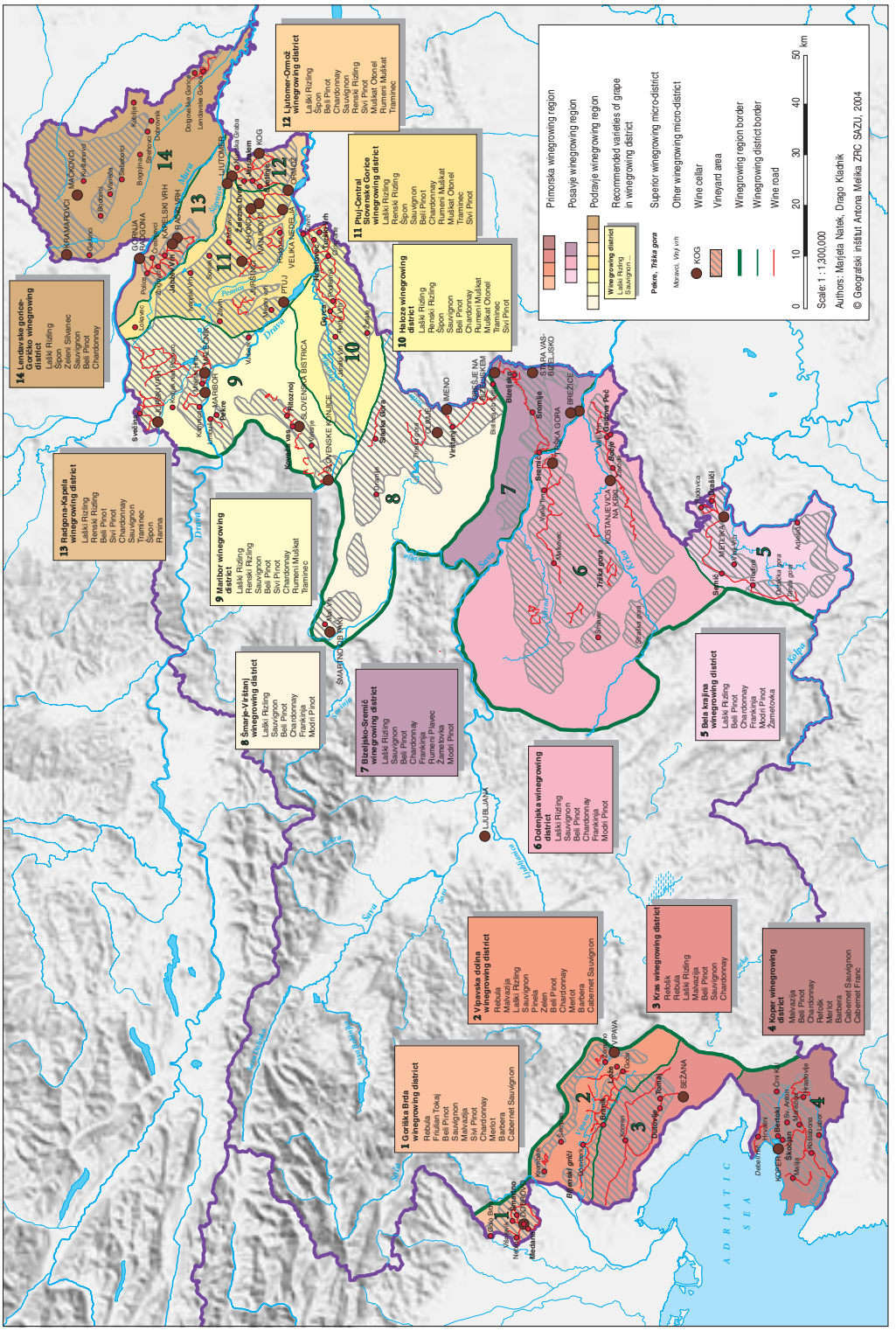
During the Farm Census in 2000, there were somewhat more than 86,300 farms in Slovenia. According to the European scale of Standard Economic Power (ESU), which considers the production capability of operations, these farms are directly comparable with European farms.

Compared with the majority of European Union countries, farms in Slovenia are extremely small. The size of the average Slovene farm was very close to the size of the average Central European farm only in 1931, and today, with an average of 5.6 hectares of farm land in use per household, it is some five times smaller than similar farms in the European Union. In spite of the great relative significance



Source: SURS and EUROSTAT

Figure 1: Size of farms in Slovenia and in the European Union relative to average area of land and number of livestock.


Primorska winegrowing region
Posavje winegrowing region
Podravje winegrowing region
Recommended varieties of grape in winegrowing district
Superior winegrowing micro-district
Other winegrowing micro-district
Wine cellar
Vineyard area
Winegrowing region border
Winegrowing district border
Wine road
Scale: 1 : 1,300,000
Authors: Marjeta Natek, Drago Kladnik
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1 Goriška Brda winegrowing district
2 Vipavska dolina winegrowing district
3 Kras winegrowing district
4 Koper winegrowing district
5 Bela krajina winegrowing district
6 Dolenjska winegrowing district
7 Bizeljsko-Sremič winegrowing district
8 Šmarje-Virštanj winegrowing district
9 Maribor winegrowing district
10 Haloze winegrowing district
11 Ptuj-Central Slovenske Gorice winegrowing district
12 Ljutomer-Ormož winegrowing district
13 Radgona-Kapela winegrowing district
14 Lendavske gorice-Goričko winegrowing district

◄ *Figure 2: Winegrowing regions.*

of stock breeding, the difference in the number of cattle is even larger since the average European farm raises some six times more cattle per farm than the average Slovene farm.

While in the period between 1981 and 1991 censuses the average size of farms in Slovenia did not change significantly, a period of moderate concentration of property and land began in the 1990's. In the period between the population census in 1991 and the Farm Census in 2000, the area of farm land in use thus increased by 0.7 hectares or a good 15%.

The size structure of farms in Slovenia is practically incomparable with the size structure of farms in the European Union. Farms that have between five and ten hectares of farm land in use (25.5%) and farms that have between three and five hectares of farm land in use (21.0%) dominate. These farms comprise the foundation of agricultural production in Slovenia and manage some two thirds of all agricultural land in Slovenia.

Along with this unfavourable structure, a major problem in Slovenia is also the considerable fragmentation of property. It is interesting that in spite of various measures for greater land concentration, this fragmentation is even increasing. The data from land cadastres in Slovenia shows that on one hand the average size of parcels is continuing to decrease while on the other the average number of parcels per farm is increasing.

The consequences of the unfavourable size structure of Slovene farms are evident in the social, economic, and production structure. Since the farms are too small to ensure the necessary income from farming alone, supplementary farms dominate. Only 20% of the farms in Slovenia are pure (full-time) farms.

According to the data from the Farm Census in 2000, farming in Slovenia employs something over 100,000 full-time workers (annual working units/AWU), which means that the average farm in Slovenia employs almost 10% more AWU than the average farm in the European Union. The number of AWU per hectare of farm land reflects the low working efficiency in Slovene agriculture. On average, four times more AWU are employed per hectare in Slovenia than in the European Union. Difficult production conditions, poorer technological equipment, a low level of professional skills among farm workers, and above all the extremely unfavourable socio-economic structure of farms all have a major influence on this.

Conclusions

Insufficient income for full employment and the corresponding unattractiveness of agriculture on the one hand and the immobility of production factors, primarily the land and the labour force on the other are the basic structural problems of agriculture in Slovenia. The increase of efficiency and competitiveness of agriculture is therefore the basic task of the agricultural structure policy, which also requires more explicit and target-oriented efforts by the country.

The fact is that it is necessary to enlarge farms which are capable of development, improve their efficiency and increase general market orientation of agriculture. For this purpose, government policy has numerous mechanisms at its disposal ranging from investment support and land policy to supporting market organization and the transfer of knowledge. In the restructuring of farms, the basic question arises of how and in what way to achieve improvement in the agrarian structure of farms in Slovenia. The real fact is that the country does not have many mechanisms for the effective general enlargement of farms. Possible measures are either too large an intervention in legal regulations (limitation of land purchases or a restrictive tax policy) or very demanding measures relative to the budget (life annuities or subsidy on land renting. Here, the Fund for Agricultural Land and Forests must play an important role with more carefully planned work.

Figure 3: Cultivated areas on gravel separate extensive patches of forest on conglomerate (photography Igor Maher).

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RURAL LANDSCAPES IN SLOVENIA

Mimi Urbanc
Drago Perko

A small country in Central Europe, Slovenia nevertheless offers a variety of landscapes, and their diversity is remarkable relative to the size of the country. For natural geographical elements, the decisive factor was its location at the junction of major European landscape units, and for social geography elements, its location at the junction of different cultural spaces: Germanic, Romanic, Hungarian, and Slavic.

Slovenia's cultural landscapes are distinguished by their diversity, their incorporation in the natural environment, and high ecological and cultural-emotional value. The basic appearance of the landscapes was created in the Middle Ages, and this legacy is still quite evident. Economic and social developments in recent decades have triggered rapid changes in the appearance and function of the landscapes, especially the rural ones on which this article is focused. Rural landscapes comprise the greater part of Slovenia since built-up areas cover less than five percent of its surface and only the capital city of Ljubljana has a population over 100,000 inhabitants.

The Slovene language has two terms for »landscape«: »*pokrajina*« and »*krajina*«. A »*pokrajina*« is a spatial unit, part of the earth's surface, a region, a complex of landscape elements, primarily a concept taken from science, while »*krajina*« is the external appearance, aspect, landscape painting, physiognomy, primarily a concept taken from art. Thus, for example, geographers use the term »*pokrajina*« while landscape architects use the term »*krajina*«, even though they mean the same thing with the two expressions (Perko 1998). A landscape painter is a »*krajinar*« in the Slovene language, his painting is a »*krajina*«, and a landscape architect is a »*krajinski arhitekt*«, while the parts of Slovene territory, for example, the Julian Alps or Kras, are called »*pokrajina*«.

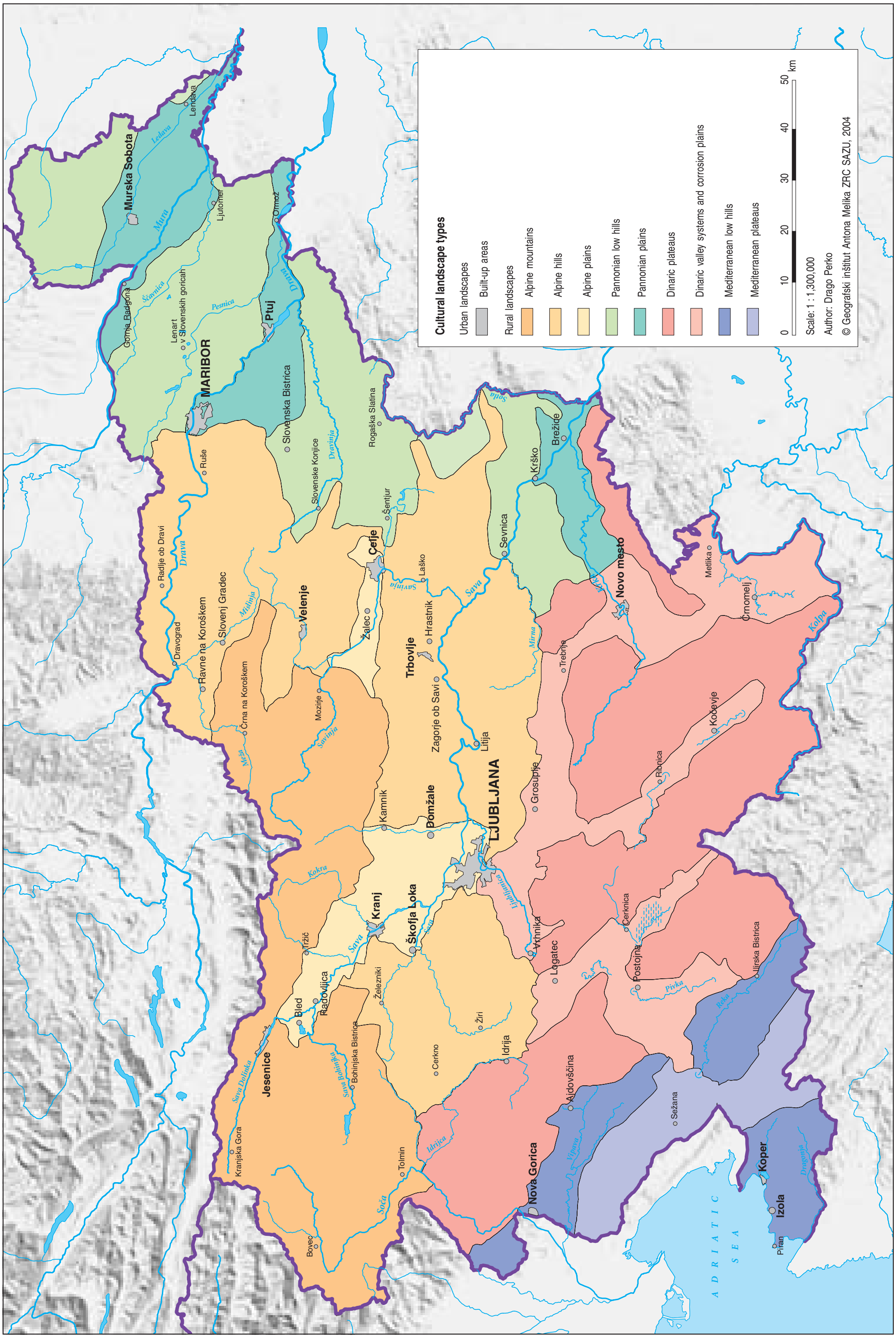
Landscape types and regions

The main natural characteristics of Slovenia's landscapes are determined by its location at the juncture of the Alps, the Pannonian plain, the Dinaric Mountains, and the Mediterranean. We can distinguish four basic landscape types and nine landscape subtypes. The basic types are Alpine, Pannonian, Dinaric, and Mediterranean landscapes, while the subtypes are Alpine mountains, Alpine hills, Alpine plains, Pannonian low hills, Pannonian plains, Dinaric plateaus, Dinaric valleys or corrosion plains, Mediterranean low hills, and Mediterranean plateaus (Perko 1998; Urbanc 2002).

Favourable natural conditions foster more rapid economic and social development and with it the intensive shaping and changing of the cultural landscape; unfavourable natural conditions limit human activity, life, and the spending of leisure time.

Historical heritage of landscape development

Slovenia's location at the junction of the Germanic, Slavic, Romanic, and Hungarian cultural spaces and the several millenniums of human settlement in its territory left deep traces on the landscape. The period of medieval colonization was particularly significant since during that time the landscape acquired its most basic features, which have been preserved to the present day with only minor changes. The legacy of this period is particularly evident in the shape and arrangement of settlements and the dis-


Cultural landscape types
Urban landscapes
Built-up areas
Rural landscapes
Alpine mountains
Alpine hills
Alpine plains
Pannonian low hills
Pannonian plains
Dinaric plateaus
Dinaric valley systems and corrosion plains
Mediterranean low hills
Mediterranean plateaus
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Drago Perko
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Murska Sobota
Lendava
Ljutomer
Ormož
Gornja Radgona
Lenart v Slovenskih goricah
MARIBOR
Ptuj
Slovenska Bistrica
Rogaška Slatina
Slovenske Konjice
Ruše
Šentjur
Celje
Laško
Radlje ob Dravi
Dravograd
Ravne na Koroškem
Slovenj Gradec
Velenje
Žalec
Trbovlje
Hrastnik
Zagorje ob Savi
Litija
Sevnica
Krško
Brežice
Novo mesto
Metlika
Črnomelj
Trebnje
Kočevje
Ribnica
Grosuplje
LJUBLJANA
Domžale
Kamnik
Mozirje
Črna na Koroškem
Kranj
Škofja Loka
Tržič
Radovljica
Bled
Jesenice
Železniki
Žiri
Idrija
Cerkno
Bohinjska Bistrica
Kranjska Gora
Tolmin
Bovec
Vrhnika
Logatec
Cerknica
Postojna
Ilirska Bistrica
Ajdovščina
Nova Gorica
Sežana
Koper
Izola
Piran
Mura
Ledava
Ščavnica
Pesnica
Drava
Dravinja
Savinja
Mislinja
Meža
Sava
Sotla
Mirna
Krka
Kolpa
Kokra
Sora
Sava Dolinka
Sava Bohinjka
Soča
Idrijca
Ljubljanica
Pivka
Reka
Vipava
Dragonja
ADRIATIC SEA

◄ *Figure 1: Cultural landscape types in Slovenia.*

tribution of cultivated fields. Various state formations (Austria-Hungary, Yugoslavia, etc.), the administrative measures linked with them, and the level of economic development reshaped natural landscapes into cultural landscapes. We should also mention the recent years since independence during which extremely rapid and profound changes have taken place due to the changed economic and social situation.

Rural landscapes and their elements that are today the subject of the greatest admiration (isolated farms settlements high in the mountains, the varied forms of minute land division) are often the result of poverty or economic stagnation. The farmhouses characteristic of individual landscapes were constructed according to the existing level of technological development and were adapted to the different needs of different people. Climate conditions also influenced the development of the landscape. At the end of the Middle Ages, winegrowing disappeared completely in Gorenjska (northwestern Slovenia) because the climate grew colder. Today, only local site names and place names testify to its existence (Blaznik 1970). The karst region is a typical example of the dilemmas linked to a cultural landscape. The Austrian authorities encouraged the deforestation of the karst region in the 18th and 19th centuries, an archetypal devaluation of a natural environment when the marvelous forests were replaced by the barren karst landscape (Gašperšič 1995). However, it was precisely this barren karst landscape that not only carried the glories of karst phenomena into the world but also was the foundation for the formation of a unique cultural landscape. Reforestation in this case would mean the loss of natural and cultural values.

The visual appearance of and changes to the cultural landscape are decisively dependent on the characteristics and development of agricultural production. This means that the concern for the cultural

Figure 2: Technological developments greatly reduced the usefulness of the kozolec, which has become merely an ethnographic relict of past agriculture and is now threatened with extinction (photography Mimi Urbanc).

Figure 3: The original folk art that appears on the front panels of beehives is linked to beekeeping, a traditional branch of Slovene agriculture (photography Jerneja Fridl).

Figure 4: Ostrnice are thinner tree trunks with branches pushed into the ground on which hay is still dried in some Dinaric regions (photography Aleš Smrekar).

Figure 5: Stone walls that reflect the toil of past generations are collapsing in many areas due to the abandonment of farming and the subsequent overgrowth (photography Mimi Urbanc).

landscape is first and foremost connected with the agricultural policy of the government. From this viewpoint, the period following World War II must be mentioned in particular since it was marked by a negative attitude toward the farmer as a private producer and by measures regarding maximum land ownership due to which the average size of farms decreased. Only a small proportion of farmers were able to carry out modernization, not to mention that the proportion of rural population began to decrease rapidly. Simultaneously, a special class of people emerged: part-time farmers who sought extra income working in nearby factories. These people deserve credit that the countryside lived on and developed. These factors, however, prevented the normal development of Slovene agriculture (Klemenčič 1991), which – as a positive consequence – is reflected in the preservation of the particular cultural landscapes with which Slovenes are identified. Thus, administrative and political measures helped preserve Slovenia's cultural landscapes. The negative side of agriculture lagging behind other economic and social progress is evident in the abandoning of farmland, the aging of the rural population, the further fragmentation of land, the small size of farms, and old-fashioned farming methods.

Recent development and future prospects

In recent decades, a *laissez-faire* approach began to appear that will continue, particularly after inclusion in the European Union. Free market policies will further accelerate the differentiation of the countryside, which is already acquiring clear outlines. In naturally more advantageous regions, intensive farming with large-scale cultivation is developing that requires large consolidated surface areas without interfering elements (e. g., hedges, free-standing trees, the traditional *kozolec* or hayrack). At the same time, the valleys and basins are centers of civilization where numerous activities intertwine and various users of the space compete with each other. First class agricultural land is disappearing due to

expressways and the territorial growth of cities. Rural settlements are acquiring the status of suburbs, and the countryside as a whole is acquiring a different role since it is becoming a place of residence and recreation for the non-farming population. The boundaries between cities and the countryside are already quite indistinct in Slovenia. At the same time, the cultural landscape in the greater part of Slovenia is disintegrating, primarily in the low-hill and hill regions (Gabrovec, Kladnik 1997). A largely aging population remains on the farms, who are emotionally bound to the land and for the moment still maintain the appearance and function of the landscape with their work. However, further abandonment of agricultural areas is to be expected in future since there are no young people except in areas closer to cities, and these no longer cultivate the land because their education allows them to work in better-paid non-farming jobs. The complete liberalization of the agricultural market would cause a considerable decrease in the number of farms and the gradual emptying of low-hill and remote regions and thus the loss of the identity of the countryside.

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INDUSTRY, DEVELOPMENTAL ASPECTS OF INDUSTRIALIZATION

Drago Kladnik

Slovenia experienced three waves of industrialization: the first at the transition from the 19th to the 20th century, the second in the 1920's before the world economic crisis, and a third especially distinctive one after World War II (Vrišer 1998).

The area of Slovenia already had several important mines and manufacturing workshops before the beginning of the industrial period. Along with metallurgy, glassworking was of great importance, based on rich forests and locations of silicate sand. The heralds of the industrial period were the coal mines, which were opened from the middle of the 18th century until the beginning of the 19th century; the first coal mine opened in 1752 in Zagorje ob Savi.

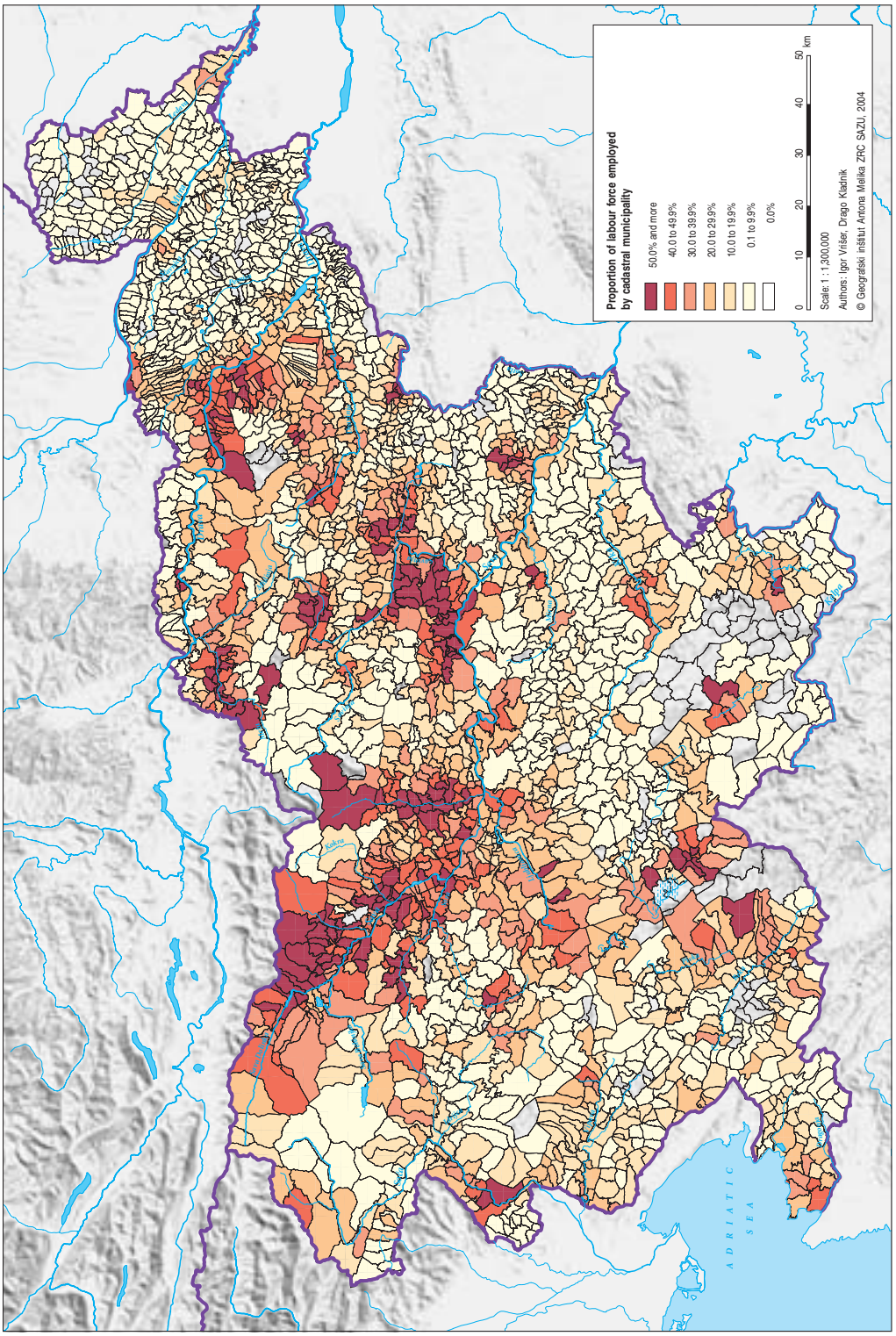
Industrial companies in the narrow sense of the word began to appear in the first half of the 19th century, first in the textile industry (Ajdovščina, Ljubljana, Prebold) and later with ironworks (Prevalje, Ravne na Koroškem), a paper mill (Vevče), and metalworking. Manufacturing operations using old production methods to produce metals, glass, cloth, linen, and leather either closed down or were forced to reform.

Industrial production methods eventually became dominant in the second half of the 19th century and the structure of the industrial sector diversified greatly. Along with ferrous and non-ferrous metallurgy and metalworking, factories producing construction materials at brickworks, lime kilns, and a while later at cement factories and the furniture and lumber, chemical, textile, leather, food-processing, and tobacco industries played an important role. In 1852, there were 116 industrial companies in Carniola and the Slovene part of Styria, and in 1912 there were 441 companies with 30,230 employees (Vrišer 1998).

In the Kingdom of Yugoslavia, industry in Slovenia experienced a new rise due to new markets and the poor industrialization in other parts of the country that continued until the world economic crisis in the 1930's. The most successfully developed were the textile, furniture and lumber, metallurgy, chemical, paper, and tire industries. In the areas that belonged to Italy at the time, the furniture and lumber and construction material industries were of greatest importance.

After 1945, new and renovated factories were at first still primarily concentrated in the so-called »industrial crescent« that had formed before World War II. From Gorenjska, this crescent stretched via Ljubljana, Zasavje, Celje, and Maribor to the Mežiška Valley. Because regional disparities had increased, the planned industrialization of regional centers (Koper, Novo mesto, Nova Gorica, Murska Sobota, Ptuj, Velenje, Kočevje) began at the end of the 1960's in accordance with a policy of polycentric development. Later, it was expanded to include numerous rural settlements (Vrišer 1998). This distribution of factories helped considerably in raising the standard of living in the countryside. Due to the increased level of employment and the modernization of the transportation network, daily commuting of the labour force from the countryside to industrial and other employment centers increased greatly (Figure 1 and 2).

Figure 1: Employment in Industry and Mining in 1961. ➤ *122*
Figure 2: Employment in Industry and Mining in 1991. ➤ *123*
Figure 3: Distribution of Industry in 1994. ➤ *124*


Proportion of labour force employed by cadastral municipality
50.0% and more
40.0 to 49.9%
30.0 to 39.9%
20.0 to 29.9%
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Scale: 1 : 1,300,000
Authors: Igor Vrišer, Drago Kladnik
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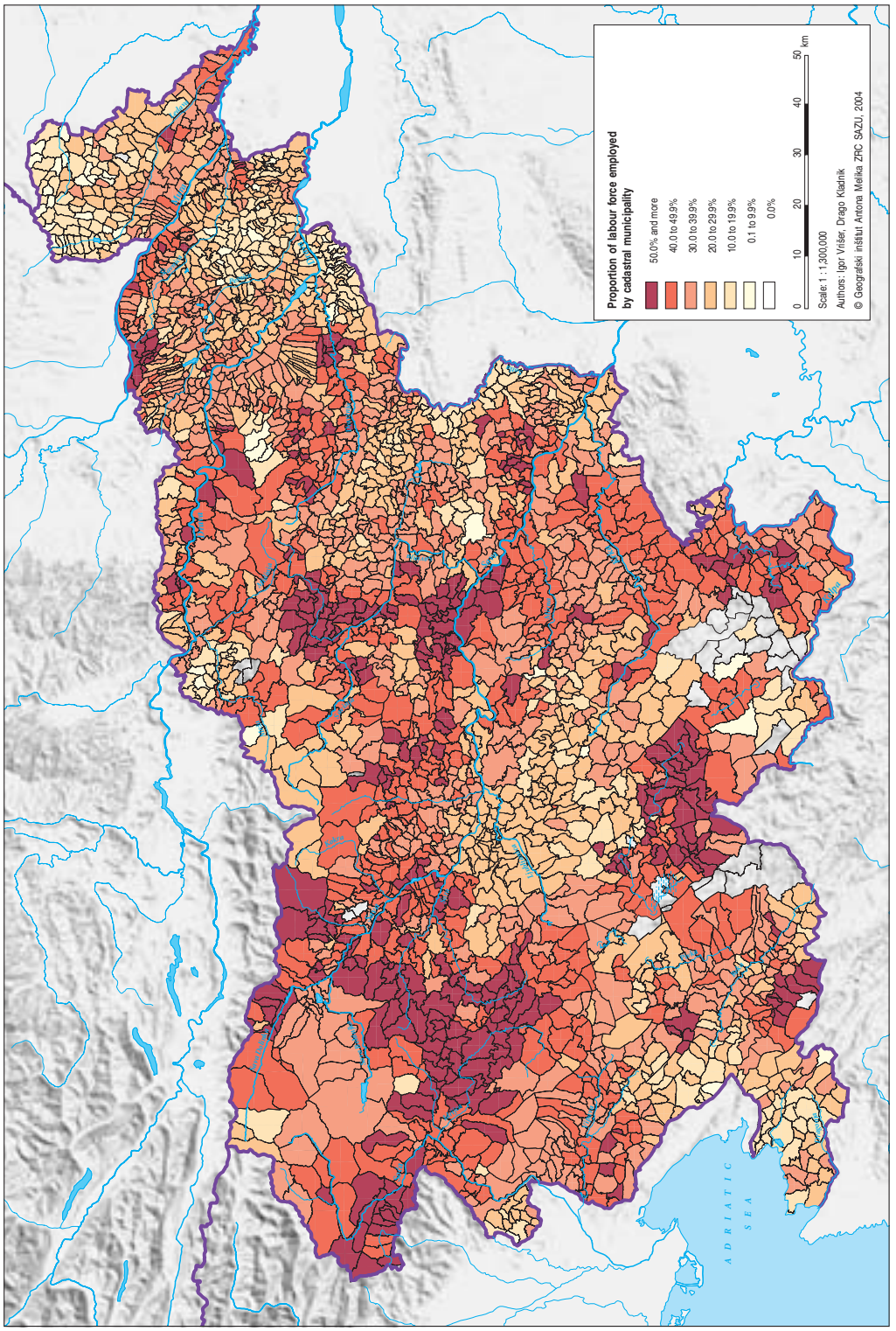
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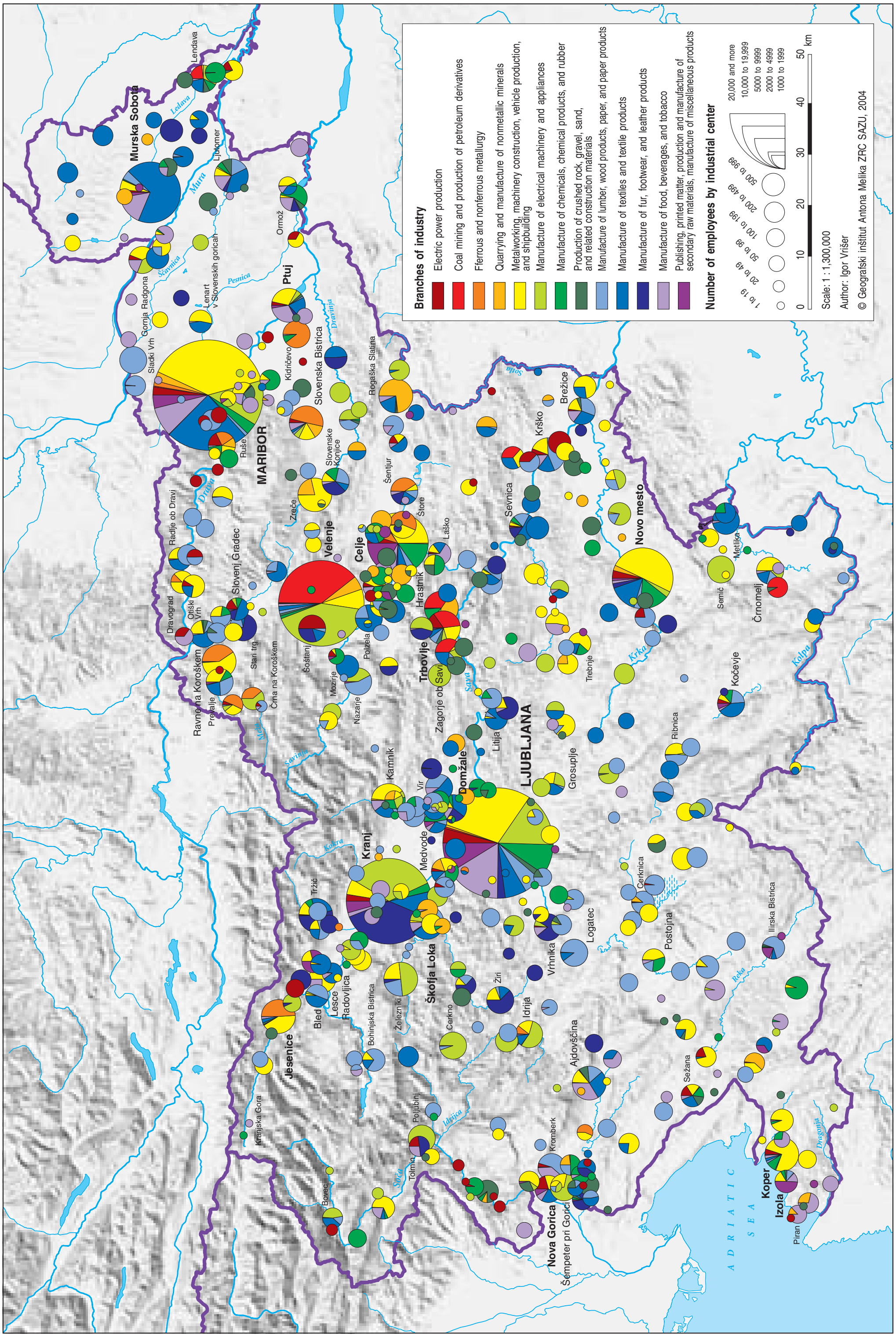
Branches of industry
Electric power production
Coal mining and production of petroleum derivatives
Fferrous and nonferrous metallurgy
Quarrying and manufacture of nonmetallic minerals
Metalworking, machinery construction, vehicle production, and shipbuilding
Manufacture of electrical machinery and appliances
Manufacture of chemicals, chemical products, and rubber
Production of crushed rock, gravel, sand, and related construction materials
Manufacture of lumber, wood products, paper, and paper products
Manufacture of textiles and textile products
Manufacture of fur, footwear, and leather products
Manufacture of food, beverages, and tobacco
Publishing, printed matter, production and manufacture of secondary raw materials, manufacture of miscellaneous products
Number of employees by industrial center
1 to 19
20 to 49
50 to 99
100 to 199
200 to 499
500 to 999
1000 to 1999
2000 to 4999
5000 to 9999
10,000 to 19,999
20,000 and more
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Igor Vrišer
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Murska Sobota
Lendava
MARIBOR
Ptuj
Celje
Velenje
LJUBLJANA
Kranj
Novo mesto
Koper
Nova Gorica
Jesenice
Škofja Loka
Domžale
Trbovlje
ADRIATIC SEA

Modern aspects of industrialization

In spite of modern development trends, industry remains one of the most important economic activities. It employs a third of the active population and contributes more than a quarter of the GDP (26.8% in 2001, rising to 33.0% in 1990) (*Statistical Yearbook* 2004).

In the last few decades, the branch structure of industry experienced substantial changes. Some branches, ferrous metallurgy and coal mining in particular, became less important even though they played a leading role until the 1960's, and at the same time, new activities appeared such as the electro-technical and machinery industries. The structure of industry was further diversified by numerous new branches such as the automobile, pharmaceutical, and clothing industries that did not exist in Slovenia before World War II.

With the independence of Slovenia in 1991 and the introduction of the market economy, the majority of industrial companies found themselves in difficulty due to the loss of the major part of their extensive market in the former common country, the restructuring of production, the lack of investment funds, and privatization, but many companies have gradually managed to overcome these problems. Some went bankrupt, many were sold off plant by plant, and others were partly or entirely bought by foreigner entrepreneurs or simply ceased operation. Simultaneously, some Slovene companies reoriented production to Balkan or Eastern European countries offering cheaper labour.

In spite of distinct restructuring and individual successful companies, Slovene industry is still prevailingly extensive with too many employees, insufficiently orientated to foreign markets, technologically outdated in many branches, and has insufficient capital for investment, in some cases even for ensuring uninterrupted production. In general, low productivity and lack of innovation still characterize Slovene industry.

The largest number of people were employed in Slovene industry in 1986, when factories employed 392,237 people and the extent of industrial production was greatest (graph). The economic crisis following the disintegration of Yugoslavia and the rationalization in employment due to attempts to increase productivity between 1990 and 1994 caused a significant decrease in the number of work places. In June 1993, Slovene industry employed 263,432 people, some 120,000 less than in the 1980's. Industrial companies were located in 515 settlements, and there were few very large centers with more than 5,000 people employed. This number was exceeded only by the seven largest cities of Ljubljana, Maribor, Velenje, Kranj, Novo mesto, Celje, and Murska Sobota (Vrišer 1998).

In the process of industrialization, individual industrial agglomerations were formed since industry as a rule established links and concentrates in locations with adequate infrastructure, transportation access, skilled manpower, or available natural resources. The largest agglomerations were the Ljubljana area (33,321 workers employed in industry), the Maribor area (23,000), Velenje with Šoštanj (12,349), and the Kranj area (12,327); in seven agglomerations, factories employed more than 5,000 workers; and in another 16, more than 2,000 workers (Figure 3).

After Slovenia's independence, employment in industry dropped sharply. In 1995, industry employed only 240,685 people or 40.9% of all employed in the country, and by 2000, the number of people, employed in industry had dropped to only 203,486. However, the number increased somewhat to 211,958 in 2001. According to the number of people employed in the industry, the most important industrial branches in 1999 were the textile and leather industry (23,717), metallurgy (18,303), electro-technical (15,764), machinery (14,361), and food-processing (12,557); other branches employed less than 10,000 workers.

Industry as a factor in environmental burdening

Slovene industry was all too much based on the concept of industrial development from the first half of the 20th century characterized by the planned development of basic industrial branches that would

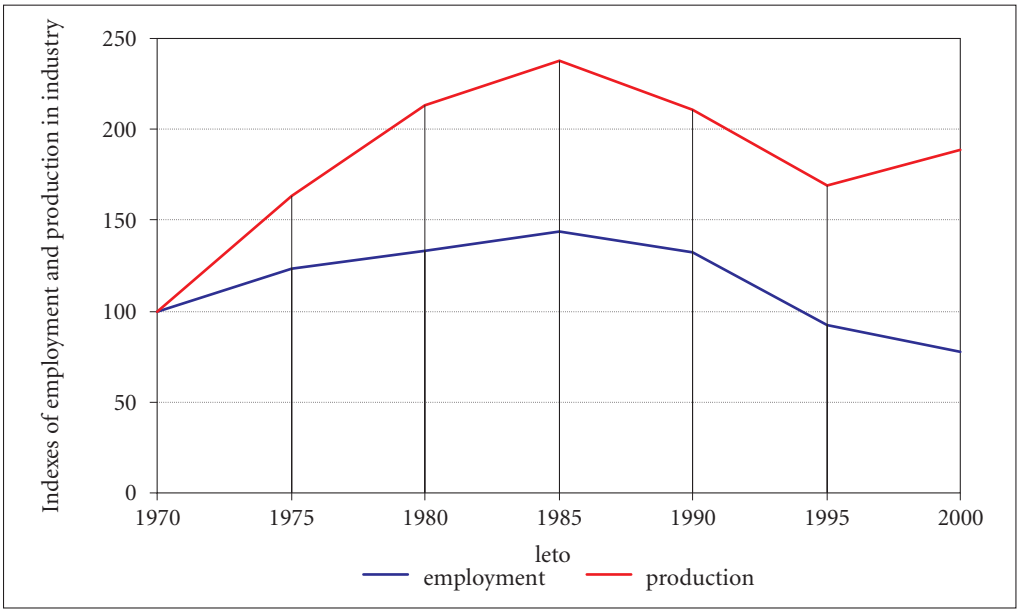

Figure 4: Indexes of employment and production in industry.

create possibilities for the development of light processing industries devoted to the production of consumer goods. It was therefore not capable of adapting to modern trends of industrial transformation based on innovation, research and development, and the demanding technologies based on the use of science in production, automation, biochemistry, and information technology.

Therefore, in spite of several more favourable indicators, the negative effects of environmental degradation are still present to a large degree. The most affected areas with barren areas are the Mežiška Valley, the Šaleška Valley, Zasavje's »Črni revir« area, and the eastern part of the lower Savinja Valley. It is estimated that some three quarters of the environment devastation is attributable to industry (Vrišer 1998).

Rivers were polluted more than average by leather factories (Šoštanj, Slovenj Gradec, Slovenske Konjice, Kamnik, Šmartno pri Litiji, Vrhnika), which in the last decade for various reasons either closed down and stopped production or reoriented their production.

The contamination of the environment with poisonous PCB's (polychlorinated biphenyls) between 1962 and 1985 by the Iskra condensers factory in Semič can be marked as a catastrophe. Environmentally, the factory producing organic acids in Ilirska Bistrica was very problematic, dumping its toxic waste into the karst Reka River, which has a limited self-cleansing ability, and endangering the Škocjan Caves, which only after the closure of the factory could be added to the UNESCO List of World Natural and Cultural Heritage Sites.

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GATEWAY TO WESTERN, CENTRAL, AND SOUTHEASTERN EUROPE

Andrej Černe

Relative to its geography, history, economy, culture, and language, Slovenia can be marked as a very diverse country that has an advantage mostly due to its favourable geographical location, relatively successful market economy, political and economic stability, industrial tradition, highly skilled labour force, and relatively high quality natural and cultural environment.

For centuries, the territory of Slovenia has been crossed by traditional transportation routes connecting northern Europe with southern, eastern, and western Europe. Slovenia's location in the northwestern part of the Mediterranean's most inland bay on the Adriatic Sea where the Alps, the plateaus of the Dinaric Alps, and the western margins of the Pannonian Basin meet gives is a relatively quite advantageous traffic and geographical position distinguished by its transitional character and the links between these geographical regions. In the wider macroregional sense, this transitional character and these links have not changed since prehistoric times. Slovenia's location significantly influenced the outline of the traffic network, which adapted to requirements regarding the choice and quality of individual routes, safety, possibilities for overcoming natural obstacles, construction technology, and last but not least, to the prevailing means of overcoming distances by transportation methods whether via pedestrian traffic, caravans and horseback riders, wagons, the railway network, or the modern planning of expressways.

With the development of Central, Eastern, and Southeastern Europe and the expansion of the European Union, these historic connections have today acquired new significance. From the transportation and geographical point of view, Slovenia is a territory that enables improving the transit character of Europe's transportation network with the further construction of missing sections and the modernization of existing sections of European traffic corridors in order to achieve the greatest possible economic and spatial integration effects. Through an appropriately developed transportation infrastructure, Slovenia ensures relatively suitable conditions for linking the European Union with the more important urban centers in Western, Central, Southeastern, and Eastern Europe. Given its geographical position, the Port of Koper, modern transportation infrastructure, and the strategic orientation and economic trends of Slovenia, its neighbouring countries, and the member countries of the European Union, Slovenia is a »gateway« to Central and Southeastern Europe.

The data on international borders and cross-border traffic says much about the geostrategic, traffic-geographical position, and the border and transit character of Slovene territory. In 2002, almost 171 million passengers crossed Slovenia's borders, including 167 million by road, 2.1 million by railway, 1.6 by sea, and just under one million by air. In the same year, in border traffic of goods transported by road alone, 33 million tons of goods crossed the Slovene border, including 22 million tons in transit, 6.5 million tons imported, and 4.6 million tons of goods exported.

For the neighbouring countries of Austria, Italy, Hungary, and Croatia, the territory of Slovenia is not just a transit territory across which they wish to establish traffic connections with European urban regions and their economic areas but also a destination area, where they wish to expand the gravitation influence of their important urban centers. The territory of Slovenia represents an important crossroads of main traffic routes between Austria, the Czech Republic, Slovakia, and Hungary, and between the three Central-European ports of Trieste, Reka, and Koper.

Austria's priority traffic orientation is to the Port of Koper and the north-south land direction connected with it, which to a great extent is also bound to the Slovene economic space. The south direction

follows, while the west direction toward Italy has the least priority because Austria already has qualitative traffic connections with Italy. Croatia's establishing as direct traffic connections as possible, mostly via Zagreb, with important urban centers in Western Europe to a large degree also occurs via Ljubljana: Zagreb–Rijeka–Trieste, Zagreb–Maribor–Graz–Vienna–Berlin, Zagreb–Ljubljana–Villach. Italy's priority traffic direction via Slovene territory is oriented toward the countries of Eastern and Southeastern Europe. The strategic interest of Hungary appears in its priority orientation to the Port of Koper and also the Port of Rijeka in Croatia. The Port of Koper, whose 20% share represents the transit traffic of goods, has a major impact on international traffic and connecting countries from different parts of Europe. This direction is followed by the orientation toward Italy, which is to a lesser degree destination oriented into Slovenia.

However, Slovenia's orientation in establishing traffic connections has different priorities. The most important is the north direction toward Austria and Germany, which are priority economic markets for Slovenia. The second most important direction is west toward Italy, which is also a very important economic partner for Slovenia. In the long term, traffic directions toward the east and south are very promising and have great prospects. Among them belongs the Port of Koper, which is of distinct international and intercontinental importance (Gulič 1999). The Port of Koper lies in the northernmost part of the Adriatic, and ships sailing to the Mediterranean via the Suez Canal can save five to ten days or up to 3,700 kilometers over using the North Sea access to Central Europe.

From the viewpoint of the global interests of neighbouring countries and the existing and newly-created forms of economic cooperation in Eastern Europe, the transportation infrastructure network in Slovenia is most suitable in particular for Italy and Hungary. Both countries are interested in connecting the Po and Pannonian basins. As one of the most developed countries, Italy sees the future of its economic expansion in a breakthrough on the markets of Central and Eastern Europe. Hence its initiative and support of the Central European initiative, and in this framework, also the idea of the Barcelona–Trieste–Ljubljana–Budapest traffic connection. Hungary wishes to play a more important role in this newly forming economic cooperation between East and West. The proposed priority solutions of the southwest-northeast connections partly oppose the interests of Croatia, which has its optimal traffic connections toward Western and Central Europe oriented via Slovenia.

Several international connections important for development and traffic run across the territory of Slovenia, including two of the seven trans-European development and traffic corridors:

- Northwest-southeast: London, Brussels, Frankfurt, Munich, Salzburg, Villach, Jesenice, Ljubljana, Zagreb, Belgrade, Niš, Istanbul or Athens; Amsterdam, Frankfurt, Linz, Graz, Šentilj, Maribor, Ptuj, Zagreb, Rijeka or the Balkan peninsula;
- Southwest-northeast: Barcelona, Milan, Ljubljana, Maribor, Budapest, Kiev.

European development corridors V and X cross on the territory of Slovenia, forming two important development axes of Europe. Corridor V establishes the Southern European development axis (Sunbelt), connecting countries from Spain to Ukraine. On this corridor are located the most important million-resident urban centers and traffic nodes of Barcelona, Milan, Zagreb, Budapest, and Kiev. Corridor X forms one of the most important development axes in the north-south direction and connects countries from Austria to Greece and Turkey. The most important urban and traffic nodes on this corridor are the million-resident metropolises of Munich, Vienna, Zagreb, Belgrade, Athens, and Istanbul. The routes of corridors V and X across the territory of Slovenia shows that they have their start and end points in Koper and an important traffic intersection in Ljubljana.

These international traffic connections compose the so-called »Slovene traffic cross«, two highly developed traffic corridors intended as an intermodal and integral traffic system since they connect the road, railway, air, and maritime traffic included in the integral European traffic network. In the spatial sense, internal, interregional, and regional passenger and goods railway traffic is therefore extremely heavily concentrated on these two basic directions through Slovenia: the southwest-northwest Koper–Ljubljana–Maribor–Šentilj–Murska Sobota direction and the northwest-southeast Jesenice–Ljubljana–

Dobova direction. More than a half of all the traffic in Slovenia flows over 14% of the traffic network in the direction of the expressways, that is, on the Slovene traffic cross.

Slovenia has been included in the joint European development policy since 1993. The strategy of development for the Slovene railway infrastructure was formed in the second half of the 1970's on the basis of the Perspective Plan for the Development of the European Railway Infrastructure (UIC), the European Agreement on Most Important International Railway Lines (UN-ECE) in the middle of the 1980's, the European Agreement on Most Important Lines of International Combined Traffic and Corresponding Installations (AGTC) at the end of the 1980's, and the European Network of Railway Lines for High Velocities (GEB) at the beginning of the 1990's (Analiza 2000).

With 1.99 million inhabitants, an average density of 98 inhabitants per square kilometers, and about 6,000 settlements, in 2002 Slovenia was crisscrossed by 1,202 kilometers of railway lines (the proportion of electrified lines totals 42%) and 20,250 kilometers of roads including 457 kilometers of expressways, 94 ilometers of highways, 983 kilometers of main roads, 4,815 kilometers of regional roads, and 13,901 kilometers of local roads (*Statistical Yearbook* 2003). Relative to the density of railway network per surface area, with 59 km/1,000 km^2 Slovenia was above the European Union average, and relative to the density of railway lines, it ranks at the very top with 604 km/million inhabitants.

Table 1: Comparison of Slovenia with Italy and Austria in the field of railway and road infrastructure in 2000.

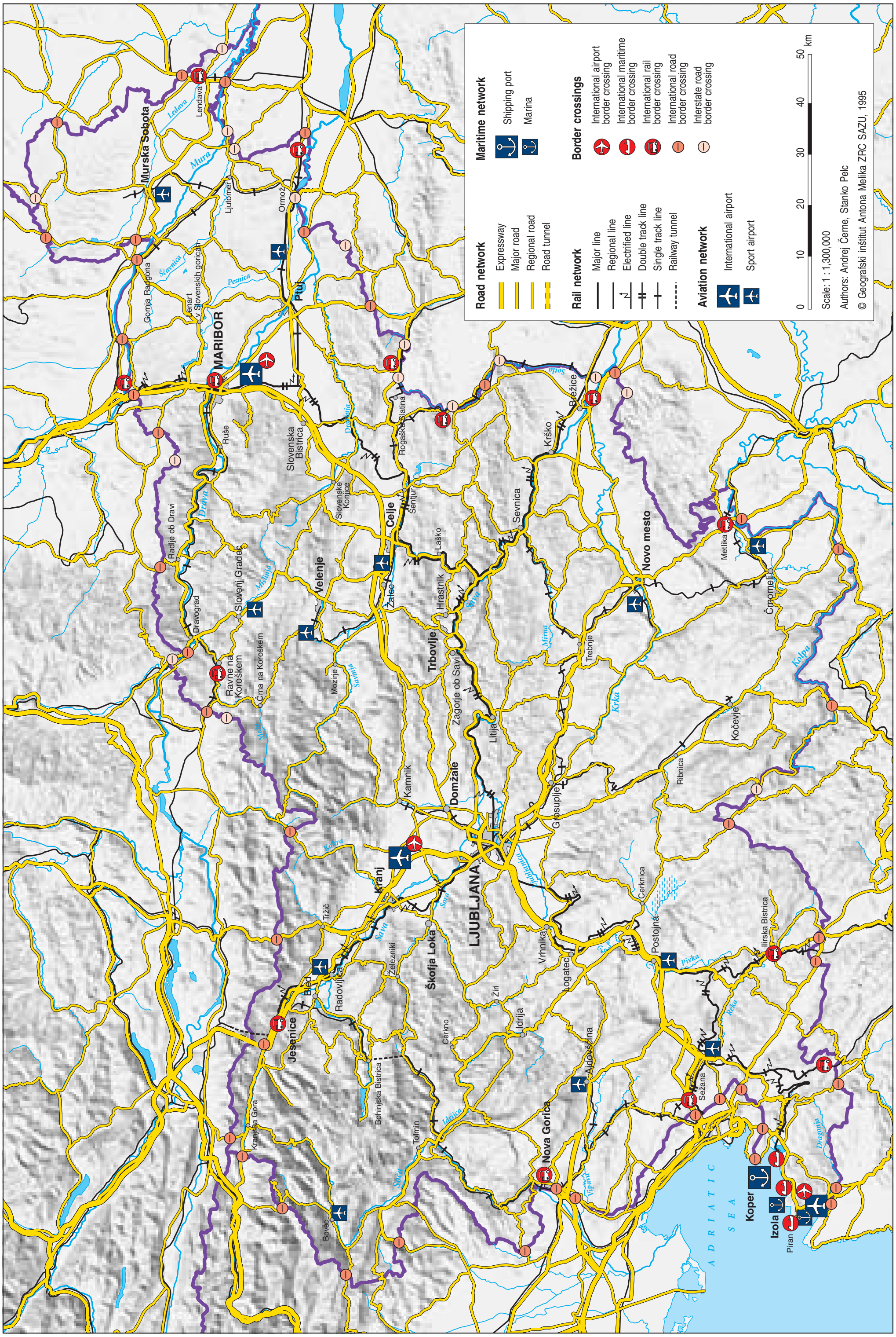
Country	Area (× 1,000 km^2)	Population	Density of population/ km^2	Length of railway lines in km	Density of railway lines km/1000 km^2	Density of railway lines km/million inhabitants	% of electrified railway lines	Length of expressways*
Austria	83.9	8.1	97	6,281	74.86	775.43	60	1,634
Italy	301.3	57.7	191	16,499	54.76	285.94	66	6,478
Slovenia	20.3	1.9	98	1,201	59.16	603.52	42	427

*1999; Source: *Statistical Yearbook* 2002.

On the basis of the relatively dense traffic network, a narrower traffic gravitation area for Slovenia developed that includes: Hungary, the Czech Republic, Slovakia, Austria, and Germany, and a wider traffic gravitation area encompassing also Poland, Romania, Russia, Benelux, France, Switzerland, and Albania. With traffic across Slovenia, countries such as Croatia, Bosnia and Herzegovina, Serbia and Monte Negro, Greece, Turkey, and Bulgaria are connected with Central and Western Europe.

All these facts have an important impact on the structure and spatial course of the traffic network and traffic flows. Approximately 90% of passenger traffic (number of trips) takes place within the country, 7% are destination-origin trips with their destination or origin in the country, and 3% are transit trips with the destination and origin outside the country. On the basis of passenger kilometers, approximately 85% of traffic is internal and approximately 15% is transit and destination-origin passenger traffic. This situation is to a larger degree characteristic of private automobile traffic, while with public transportation, the proportion of transit and destination-original traffic is lower. Thus, internal traffic prevails on the roads, specifically passenger traffic. In passenger traffic, almost two thirds (62.5%) of the mileage goes to private automobiles (passenger kilometers), 30.1% to public transportation, and 7.5% to railway traffic (air and sea traffic are not considered).

The major part of passenger traffic therefore goes to automobile traffic, which is also on the increase. On the roads, private automobile transportation dominates, and in passenger traffic, almost two thirds


Road network
Expressway
Major road
Regional road
Road tunnel
Rail network
Major line
Regional line
Electrified line
Double track line
Single track line
Railway tunnel
Aviation network
International airport
Sport airport
Maritime network
Shipping port
Marina
Border crossings
International airport border crossing
International maritime border crossing
International rail border crossing
International road border crossing
Interstate road border crossing
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Authors: Andrej Černe, Stanko Pelc
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LJUBLJANA
MARIBOR
Murska Sobota
Lendava
Ljutomer
Ormož
Ptuj
Gornja Radgona
Lenart v Slovenskih goricah
Ruše
Slovenska Bistrica
Slovenske Konjice
Rogaška Slatina
Šentjur
Celje
Žalec
Laško
Hrastnik
Trbovlje
Zagorje ob Savi
Litija
Velenje
Slovenj Gradec
Dravograd
Radlje ob Dravi
Ravne na Koroškem
Črna na Koroškem
Mozirje
Kamnik
Domžale
Kranj
Tržič
Jesenice
Bled
Radovljica
Kranjska Gora
Bohinjska Bistrica
Železniki
Škofja Loka
Žiri
Cerkno
Idrija
Tolmin
Bovec
Nova Gorica
Ajdovščina
Vrhnika
Logatec
Postojna
Cerknica
Grosuplje
Ribnica
Kočevje
Ilirska Bistrica
Sežana
Koper
Izola
Piran
Krško
Brežice
Sevnica
Trebnje
Novo mesto
Metlika
Črnomelj
Mura
Ledava
Ščavnica
Pesnica
Drava
Dravinja
Mislinja
Meža
Savinja
Sava
Sotla
Krka
Mirna
Kolpa
Kokra
Ljubljanica
Pivka
Reka
Idrijca
Soča
Vipava
Dragonja
ADRIATIC SEA

◄ *Figure 1: Transportation network in 1996.*

Table 2: Passengers carried and passenger kilometers in road and railway traffic between 1995 and 2001.

	Passengers carried (× 1,000)		Passenger kilometers (× million)	
	Road traffic	Railway traffic	Road traffic	Railway traffic
1995	121,573	13,307	2,507	595
1996	113,411	13,683	2,348	613
1997	109,801	13,568	2,195	616
1998	102,561	13,907	2,098	645
1999	96,573	13,756	1,940	623
2000	74,560	15,010	1,581	705
2001	72,504	14,484	1,470	715

Source: *Statistical Yearbook* 2002.

goes to private automobiles (passenger kilometers). The ratio between private and public passenger traffic shows that 60% of all passengers used cars and 40% used means of public transportation in 1977. Today, it is estimated that the number of those who use cars is about 70% and the proportion of those who use means of public transportation is only about 30%.

Table 3: Proportion of passenger traffic by type of transport between 1995 and 2001 (millions of passengers carried).

Type of transport	1995	1996	1997	1998	1999	2000	2001
City	53.4	55.5	56.11	65.3	57.2	59.0	54.6
Public roads	41.8	39.5	38.9	38.2	37.2	33.8	37.5
Railway	4.6	4.8	4.8	5.2	5.3	6.8	7.5
Air	0.2	0.2	0.2	0.3	0.3	0.4	0.4

Source: *Statistical Yearbook* 2002.

More than 90% of internal public passenger traffic is carried by buses (55% city and suburban traffic, 45% interurban traffic), while 9% is carried by the railway. According to the purpose of trips, the proportion of daily migration is relatively high since 70% of all employed Slovenes commute to work daily. School children comprise about half the daily migration. Half of the commuters take public bus

Table 4: Proportion of goods traffic according to type of transportation between 1995 and 2001.

Type of transport	1995	1996	1997	1998	1999	2000	2001
Railway	66.3	62.6	64.6	66.1	66.8	65.3	64.7
Public road	19.8	21.6	20.4	19.5	18.5	19.3	20.2
Sea	13.9	15.8	15.0	14.4	14.3	15.4	15.1

Source: *Statistical Yearbook* 2002

transportation, a good third take automobiles, and a quarter take the railway. Almost 70% of all population has good access to the bus network, and a good half to the railway network. Regrettably, some areas still have extremely poor access to public transportation (Černe 2002).

Characteristic of road goods traffic is the relatively high proportion of internal traffic and the small proportion of transit and destination-origin traffic, although the latter has increased in the last few years. On the railway, transit and destination-origin traffic dominates, while the proportion of internal traffic is smaller. In the field of goods traffic, the ratio between road and railway expressed in tons of goods carried is 77:23, and expressed in net ton kilometers, 58:42 in favour of road traffic.

Table 5: Goods traffic in road and railway traffic between 1995 and 2001.

	Internal transport (× 1,000 t)		International transport (× 1,000 t)		Net-ton kilometers (× million)	
	Road	Railway	Road	Railway	Road	Railway
1995	2,667	1,752	1,769	13,141	1,740	3,076
1996	2,714	1,811	1,831	11,344	1,705	2,550
1997	2,681	1,600	1,841	12,760	1,775	2,852
1998	2,334	1,591	1,905	12,805	1,903	2,852
1999	1,974	1,751	2,051	12,475	1,874	2,784
2000	2,146	2,028	2,323	13,036	2,090	2,857
2001	2,133	1,700	2,523	13,219	2,267	2,837

Source: *Statistical Yearbook* 2002.

More than 90% of internal and 63% of international goods traffic flows on the roads. More than a half of the goods traffic across Slovene territory runs on the railway. From the international viewpoint, the proportion of goods transported via railway in Slovenia is relatively high. Here, the Port of Koper plays an extremely important role since three quarters of all the goods arriving at the Port of Koper are carried by railway. Of this traffic, the proportion of transit traffic is almost two thirds, most of which goes to or comes from Austria (26%), Hungary (15%), and the Czech Republic (8%) (Černe 2002).

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THE RECOVERY OF TOURISM IN SLOVENIA

Anton Gosar

The European political map at the dawn of the 21st century is characterized by:

- emerging new nation-states (Estonia, Latvia, Lithuania, The Czech Republic, Slovakia, Slovenia, Croatia, Bosnia and Herzegovina, Macedonia, Serbia and Montenegro);
- self-proclaimed entities (The Republic of Northern Cyprus),
- entities constructed by the international community (the Federation of Bosnia and Herzegovina and the inter-entity division within)
- areas which have been placed under short (Albania, Macedonia) or long term international protectorate, or a form of it (Bosnia and Herzegovina, Kosovo);
- the strengthening of the Atlantic core region due to the unified currency (Euro), the enlargement of the Euro-Atlantic security area (NATO) and the enlargement of the nation-state federation of the European Union with new member states: Estonia, Latvia, Lithuania, Poland, The Czech Republic, Slovakia, Hungary, Slovenia, Malta and Cyprus.

Along with the political and economic disruptions, linked also to the fall of the Iron Curtain and the transition from communism to democracy, and from the socialist to market economy, the Southeastern Europe – including Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Macedonia, Romania, Serbia and Montenegro and Slovenia, as an entity of former Yugoslavia – experienced worst times in tourism industry's history ever.

As a destination, Southeastern Europe is and was lagging behind western destinations based on measurements of visitor arrivals, tourism amenities and receipts. With the exception of Ex-Yugoslavia, which was among the 10 most visited countries of the world in the 1980's, all other countries of the area, including Greece, can not be lined up along such giants as France, Spain or Italy. At this point we are not going

Table 1.: International Inbound Tourism – Number of Tourists (in 1000).

Country/Year	1967	1977	1987	1997	2002
Albania	–	–	–	28	49
Bosnia and Herzegovina	170	250	394	11	97
Bulgaria*	1783	4570	7594	1322	2560
Croatia	2083	3853	5621	4178	6544
Greece*	879	3961	7564	10070	14033
Macedonia	94	215	221	219	230
Romania*	1451	3685	5142	2957	3300
Slovenia	678	877	1137	616	1302
Serbia & Montenegro	718	1190	1272	156	560
Southeastern Europe	7856	18601	28945	16742	28675

* foreign citizens counted as tourists at border-posts in 1000 (all other countries count visitors as tourist as they spend one night in tourist amenities)

Source: *OMT Annuaire de Satitistique du Tourisme / WTO Yearbook of Tourism Statistics / OMT Annuario de Estadisticas del Tourismo, WTO Headquarter, Madrid, 1980, 1990, 1999, 2003; Statisticki godisnjak SFRJ (Statistical Yearbook of the SFR Yugoslavia), Belgrade, 1970.*

to question published hard data, statistics and the methodology being used. But it is worthwhile to mention that most countries of the region register tourists as such at border-posts, as they declare their intention accordingly. In the area of Ex-Yugoslavia, new nation-states follow the tradition of counting tourists as they registers at the first amenity (bed-nights).

In terms of visitor arrivals, several indicators give some insight into this region's current standings and trends. The former Yugoslav republics experienced extreme growth in the 1980's. In particular the Mediterranean part (Eastern Adriatic) the coasts of Slovenia, Croatia and Montenegro have experienced growth similar to Spain (Gosar 1989). Between 1991 and 1995, tourism collapsed completely. Ethnic violence and war have stopped most of international arrivals. What was one of the world leader as far as international tourism destinations is concerned, found in the late 1990's its tourist industry struggling. Where peace was established relatively soon, as in Slovenia, the present-day situation (arrivals and receipts) is finally comparable to the mid – 1980's, as close to 90% visits in the most prosperous year are registered. Their, In Slovenia, the past development is reconsidered, new goals are set and new tourism policies are implemented (Mihalič, Sirše).

Table 2: Southeastern Europe: Growth of International Tourism (in 1000).

Country/Year	Index 1977/1967	Index 1987/1977	Index 1997/1987	Index 2007/1997	2007*
Albania	–	–	–	151	74
Bosnia and Herzegovina	147	158	3	1322	146
Bulgaria	1783	4570	7594	1322	3840
Croatia	2083	3853	5621	4178	9816
Greece	879	3961	7564	10070	21050
Macedonia	94	215	221	219	531
Romania	1451	3685	5142	2957	4950
Slovenia	**678**	**877**	**1137**	**616**	**2929**
Serbia & Montenegro	718	1190	1272	156	1260
The Balkans	7856	18601	28945	16742	43013

* = related to WTO estimations.

The Case of Slovenia

Before the breakup of Yugoslavia, Slovenia's tourist economy played a major middle-man role in distributing visitors to the Adriatic. Slovenian based Ex-Yugoslavia's travel agencies, like KOMPAS, with its headquarters in Ljubljana, had in the 1980's a share of close to 43% of package tours and organized leisure stays in the Northern-Adriatic (Istrian Peninsula and the Kvarner Bay). With major links to the German tour-operators, like Neckermann, TUI and others, they succeeded in dominating the regional travel industry in its most vital part, namely, in the area where the Mediterranean meets the European population axis (50° N) at its shortest distance. In times of the young automobile society, as leisure travel by air was less then rare and overseas resort almost non-existent, the geopolitical locality close to the consumer population and, at the same time, on the edge of the western world was of an outstanding importance. Slovenia's travel agencies soon became major tour operators in the Eastern Mediterranean and in Central Europe. British and American markets responded enthusiastically as the bus tours offered included the Balkans, and its most diverse part Bosnia, the area of the former Habsburg Empire (Austria, Hungary, Czechoslovakia), as well as the Catholic, Orthodox and Muslim worlds (Italy, Bulgaria, Romania, Greece and Turkey) on both sides of the Iron curtain combined.

Figure 1: Shooting rapids on Soča River (photography Jurij Senegačnik).

Slovenian companies invested also, with profit in mind, into hotels, marinas and other infrastructure in several republics of the former federation. The famous pilgrimage town of Medjugorje in Bosnia and Herzegovina received unrestricted Slovenian support, as it developed its hotel/motel infrastructure. On Dubrovnik's major hotel area Lapad, the first hotel built in the early stage of modern tourism was a Slovenian development. No doubt, that Slovenia, the richest republic of the former multi-ethnic federation, discovered the significance of tourism for its own and Ex-Yugoslavia's national economy in its early stage. Being rarely a final tourist destination, Slovenia accommodated itself to the fact that visitors most often just crossed the area towards places in the Mediterranean. Slovenia had

Table 3.: Slovenia: Tourist Visits and Bed-Nights, 1965–2000.

Year	All visits (in 000)	No. visits (in 000) National	No. visits (in 000) Foreign	All bed-nights (in 000)	Bed-nights (in 000) National	Bed-nights (in 000) Foreign
1965		743	483		2.617	1.433
1970		973	807		2.529	2.301
1975		1.311	841		3.854	2.590
1980		1.509	869		4.976	2.795
1985		1.697	1.056		5.093	3.729
1990		1.442	1.095		4.283	3.673
1995		844	732		3.448	2.435
2000						

Source: *Letopis SR Slovenije (Yearbook of Statistical Data on Slovenia), Ljubljana, 1970–1998.*

around 10% of the visits/overnights in former Yugoslavia. In the 1970's foreign tourists visiting Slovenia spent 3.1 days in exploring Slovenia, whereas visits to the Croatian coastal communes were an average three-times longer (see above). Slovenia had, just before the breakup of Yugoslavia, close toa total of one hundred thousand beds but 89% of them were located in just 13 out of 66 Slovenian communes (Jeršič 1992). These were located along the major traffic and tourist transfer axis, which lead visitors from the Austrian border in the north to the border with Croatia in the south and constituted the backbone of the tourist industry within Slovenia in the years 1965–1991. In 1986, in the peak year of Slovene tourism (2.821.000 guests, 9.213,000 overnights) 1.051,000 foreign visitors visited Slovenia. Predominantly the Slovene Littoral (58%) was popular among foreign guests. Surely Slovenes could succeed in attracting more foreign guests into Slovene Alps or into spa-resorts, where the combined share of foreign visitors was close to 39%, if they would promote resources and offer appropriate recreation and accommodation facilities. A detailed survey of data in 1986 showed that out of 2.5 million tourist overnights in the Alps (27% of all) only one fourth were made in hotels, motels and boarding-houses (»penzioni«) (Gosar 1989).

The conflicts on the Balkan peninsula have had an effect on both accommodation capacity and the structure of visits to Slovenia (Table 5, 6, 7)! The tragedy of the war was, at the same time, an impulse and a start of a re-thinking process in the tourism economy of the nation. Statistical data show that the pre-war path in tourism has already been changed at several levels of the tourist industry. A reduction of available beds and the increase of quality of tourist amenities was set in 1993 already. Several new resources, in particular spas, gambling and diverse rural establishments (Barbič 1995; Drozg 1993), have increased the mosaic of Slovenia's tourist amenities at the end of the 1980's. The necessity for the change in the tourism policy resulted mainly from the new geopolitical reality in the region!

Table 4.: Slovenia: Accommodation Type and Occupancy.

Year	Accommodation All	Accommodation in Hotels	Yearly Occupancy All	Yearly Occupancy in Hotels
1965	42,546	16,349	26%	43%
1970	69,819	30,633	21%	44%
1975	67,437	30,080	26%	46%
1980	71,927	28,850	29%	47%
1985	82,772	27,399	28%	46%
1990	91,215	27,532	24%	44%
1991	74,964	28,274	18%	29%
1995	72,853	33,878	22%	33%
2000				

Source: *Letopis R Slovenije (Yearbook of Statistical Data on Slovenia), Ljubljana, 1970–2003.*

The break-up of Yugoslavia and the hostilities that followed and continued for five years in the neighborhood of Slovenia have had a disastrous impact on Slovenian tourism. The government of Slovenia issued a statement claiming a direct loss of 122 million US Dollars in tourism. The long term estimated loss was put at 316 million USD (Mihalič 1995). Today, tourism experts consider the estimate of the losses as very low. In 1992 Slovenian tourism had reached, in term of nights spent in tourist amenities, just 55.3% of its peak year 1986. In 1996 the Slovenian tourist market recovered to 65.3% of the visits and 73.3% of the bed-nights. Hotels showed an average yearly occupancy index of 33% over the period 1991–1996, a drastic fall to the 1986 figure of 47%. Spas were less affected by the reduced number of visitors (occupancy index 54.2%). Comparison of statistical data shows the interest in visiting

Table 5.: Slovenia: Tourists According to Residency (in 000).

Year	Domestic Guests	Foreign Visitors to Slovenia				
	Slovenia	Ex-Yugoslavia	Austria	Italy	Germany	United Kingdom
1965	393	351	86	98	90	38
1970	543	539	110	217	235	45
1975	582	628	99	146	219	31
1980	658	850	77	132	273	30
1985	749	948	97	166	292	87
1990	651	789	87	282	227	82
1991	687	344	38	97	48	8
1995	845	125	117	160	136	14
2000						

Source: *Letopis SR Slovenije (Yearbook of Statistical Data on Slovenia), Ljubljana, 1970–1998.*

Table 6.: Slovenia: Tourists According to Regions Visited, 1990–2000.

Resorts	1990		1995		2000		2002	
	Tourists	Bed-Nights	Tourists	Bed-Nights	Tourists	Bed-Nights	Tourists	Bed-Nights
Spa Resorts – The Pannonian Lowland	289	1,823	340	1,885	418	2,113	485	2,327
% Foreign	29%	26%	27%	27%	32%	30%	38%	36%
Coastal Resorts – The Mediterranean	450	2,102	370	1,663	475	1,884	510	2,052
% Foreign	58%	66%	43%	38%	49%	48%	54%	53%
Mountain Resorts – The Alps	601	2,117	441	1,443	523	1,613	566	1,749
% Foreign	46%	52%	42%	46%	57%	61%	64%	67%
Ljubljana – The State Capitol	1,142	1,790	406	846	515	1,047	568	1,117
% Foreign	39%	38%	69%	73%	78%	79%	81%	80%
Other Destination	54	123	20	47	26	63	32	76
% Foreign	37%	29%	60%	60%	65%	56%	69%	62%
Slovenia	2,537	7,956	1,578	5,883	1,957	6,719	2,162	7,321
% Foreign	43%	46%	46%	41%	56%	51%	60%	55%

Source: *Letopis R Slovenije (Yearbook of Statistical Data on Slovenia), Ljubljana, 1970–2003.*

Figure 2: The Portorož marina is one of the largest on the Adriatic Sea (photography Marjan Garbajs).

Slovenia heavily reduced in particular in traditional markets like Germany (–55.1%), United Kingdom (–86.4%) and the Netherlands (–82.8%). With the exception of Germany (recovery up to 67.8% of 1990), no improvements were shown by 1996. Neighboring Austrians enlarged their presence by more than a third, whereas Slovenes doubled their share in nights spent in tourist amenities from 25.6% in 1990 up to 60.5% in 1992 and 49.8% in 1996. The reduction of the income from of tourism was not as drastical as one would conclude out of the above statements. In 1989 US$ 657,839.000 were earned of tourism. In 1992 the income was just for a mere 2.6% lower (US$ 640.933.000) and 1996 showed earnings of US$ 1.221,735.000 (Zorko 1997). These result were due in particular to accomplishments in the gambling and duty-free segments of the tourist economy.

The development strategy of the new nation-state put in 1994 priorities in tourism mostly within the field of education, research and promotion. At the same time it strongly suggested the need to improve the quality of services and of the general infrastructure (road construction), and has stated concerns regarding the environment in general. This paper has no intention of discussing the broad spectrum of these topics. It can report that a general trend towards improvement on every subject named above is well under way. By 2002 Slovenia will gain 318 kilometers of four lane highways, just to name the major projects of the state. Along with the general statement, the document discussed outlined five special segments of the tourist economy as goals for the next development period:

- the development of new and reconstruction of existing ***spa-resorts*** (East Slovenia being East Central Europe's richest mineral/thermal water region);
- the promotion of past cultural imprints, in particular in ***cities*** (traces of the Roman Empire's and several later states and cultures heritage can be found);
- the realization of the »sustainable tourism« idea, in particular in Slovenia's ***alpine and karstic*** mountainous area (the South-Eastern Alps are the least developed area of the alpine bow (the Triglav National Park); Slovenia's landscape cover consists mostly of forests (52%) – it is in this regard the richest European country, other than Nordic countries);

- the improvement of tourist amenities and the opening of new attractions (casinos) in the area of the ***Mediterranean,*** close to the major consumer population (Italy);
- the improvement and intensification of the crossborder flow (duty-free shops) and development of regional, ***transnational tourist areas*** – especially in the triangle Italy, Austria, Slovenia /Tromeja – das Dreilaendereck – Tre Confini/ – being candidate for Winter Olympics in 2006 (Dolgan - Petrič, 1997).

Table 7.: Slovenia: Visits to Selected Spa-Resorts, 1961–1995 (in 000).

Resort	1961		1971		1981		1991		2000	
	Guest	Nights	Guest	Nights	Guest	Nights	Guest	Nights	Guest	Nights
Slovenia	822	2900	1902	5444	2419	7680	1425	4886	1576	5883
Spa-resorts	52	659	111	783	173	1224	241	1481	333	1993
	6.3%	22.7%	5.8%	14.4%	7.2%	15.9%	16.9%	30.3%	21.1%	33.9%
Čatež	3	29	17	62	49	155	58	313	83	470
Moravci	–	–	10	41	18	96	33	174	51	246
Olimia	–	–	–	–	9	97	29	198	36	231
Rogaška	21	267	24	241	34	329	33	226	43	265
Radenci	5	65	11	100	22	169	20	112	20	106

Source: *Letopis R Slovenije (Yearbook of Statistical Data on Slovenia), Ljubljana, 1970–2003.*

The statistical data 1991–1996 show the improvement in two fields of action: in several spa-resorts of the Pannonian region (Tab. 8) and in the area of the Mediterranean (Portorož – Portorose), including its hinterland. In both areas the success is a result of the coordinated action of the state and local entrepreneurs as well as of the inherited geopolitical situation. Spa-resorts, like Čateške toplice, Atomske toplice, Moravci and Radenci have opened several new attractions (»Tropical Paradise«) and amenities based on its (mineral/thermal) natural resource (Horvat 1996). In addition to it, they have enlarged their field of action with golf (Mokrice) and other medical and recreational amenities. Because of the uncertain political situation in the Balkans (1991–1996)), a large number of Slovenes, who normally would spent their vacation along the Adriatic coast of Croatia, have decided to enjoy the newly equipped and modernized spas. On the other hand has the Slovenian Littoral has gained out of the short term visits of its neighbors Italians and own nationals. The innovation in the field of tourism there is based on several gambling facilities, among which Nova Gorica has had by far the best results in visits. The improvement of the quality of accommodation and guest services and the construction of several new amenities, like ports (marinas), sport facilities and swimming pools with thermal waters, suggest that the Slovenian tourist industry has come to the conclusion that, along with the triple S (Sun, Sea, Sand) effect, other attractions must be offered/added – the triple E (Education, Experience, Emotion) to attract the increasingly »spoiled« visitors.

Conclusion

The hardest hit tourist destinations of the Balkans, Croatia and Slovenia (of former Yugoslavia), show a slight but continuing recovery from the direct and broader effects of the wars 1991–1995. In 1998 the recovery was at and above 60% of the level in 1990. But the structure of tourist visits is completely different to the pre-war years. Instead of hosting German, Dutch and British tourists, a regional tourism-exchange takes place. Up to 75% of holiday makers come from Slovenia, Croatia, Italy and Austria. Tourist from the Czech Republic are the most noted non-regional visitors. Since Croatia and

Slovenia are as close to the war torn part of the Balkans as Bulgaria, Greece, Romania and Hungary, it is most likely that the Yugoslavia (Serbia and Montenegro) bombing campaign by NATO, which goes on during the writing of the conclusions of this paper, will effect them equally. We, of course, can not speak of tourism – in the general known sense – in countries like Albania, Bosnia, Macedonia and Yugoslavia who participate in one or another way directly to the conflict.

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TOURISM IN SLOVENIA

Uroš Horvat

Tourist potentials of landscapes in Slovenia

Slovenia comprises regions that are quite diverse in their natural and cultural character. Consequently, features of the landscape that can influence tourist amenities or its suitability for different modes of tourism and recreation vary considerably across relatively short distances.

The Submediterranean region includes a forty-six kilometer coastal belt along the Adriatic Sea. Temperatures suitable for bathing and sunbathing (air: above 25° C; sea: above 19° C) last from the end of May until October. The medieval cores of coastal towns with their age-old urban organization and architectural heritage also offer an attractive environment for tourists.

Behind the coastal belt at an altitude of 400–500 meters is the Karst region. The limestone plateaus are of typically karstic character with numerous morphologically interesting karst caves and karst surface phenomena. Typical of the cultural landscape are the old central cores of karst villages with their almost urban structure and the vineyard complexes scattered over the more fertile patches of karst soil.

The Dinaric plateaus rise toward the interior of Slovenia and quite frequently reach altitudes of 1,000–1,200 meters or even more. From the viewpoint of tourist attractions, we need to point out the karst poljes (containing periodic karst lakes), underground karst caves (with long tunnels, great caverns, and rich dripstone decoration), and vast, sparsely inhabited forested plateaus (with the most diverse species of wildlife, including brown bears).

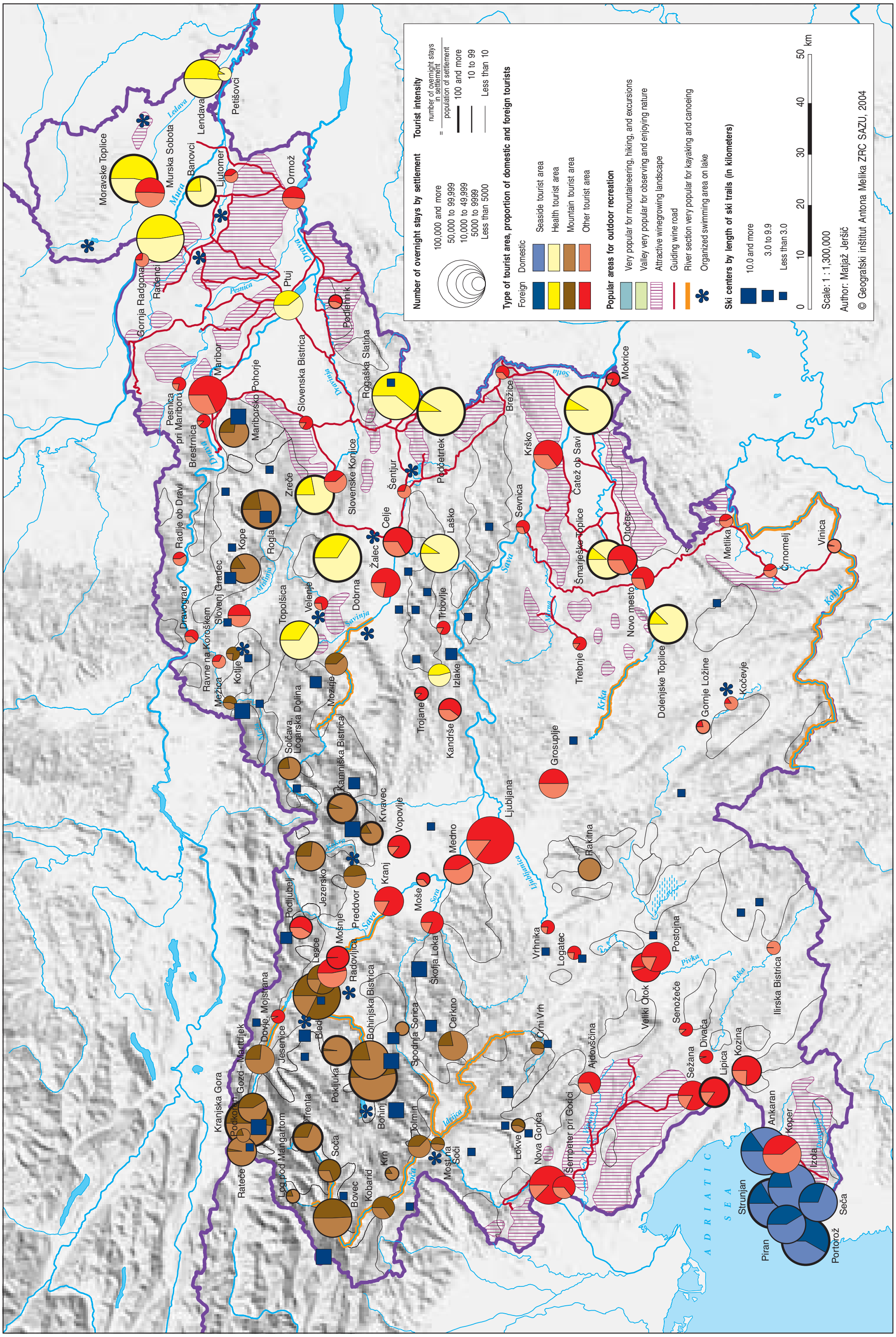
The Alpine region covers the western and northern parts of Slovenia. Only a small portion of this area reaches altitudes over 2,000 meters. Typical of this region are sharp relief forms with glacially transformed valleys (which gives this landscape a high-mountainous character at lower altitudes), diversity of relief and vegetation (these vary over quite short distances, so the region is particularly suited for hiking and landscape sightseeing), considerably long-lasting snow cover (suitable for winter sports), mountain brooks and smaller rivers, etc. Alpine pastures are particularly characteristic of the cultural landscape, and together with the traditional architecture increase the landscape diversity of the region.

Subpannonian hills with intervening plains are located in eastern and northeastern Slovenia. From the viewpoint of tourist attractions, we need to point out the »belvedere« ridges, sunny slopes with typical vineyard landscapes, and the region's numerous thermal and mineral springs.

Tourist flows to Slovenia and the development of tourism

An important turning point that marked the beginning of more intensive tourist travel to Slovenia occurred in the middle of the 19th century when a railroad was built linking Vienna (Austria), Ljubljana (Slovenia), and Trieste (Italy). The railroad enabled tourists to observe natural karst phenomena (in particular, the two world-famous caves of Postojna and Škocjan) or to visit health spas in eastern Slovenia.

When the Salzburg (Austria)–Jesenice (northwestern Slovenia)–Ljubljana railroad was also built in the second half of the 19th century, it linked Slovenia with southern Germany. The improved railroad connections through the Slovene Alps contributed to the flourishing of alpine tourist resorts,


Number of overnight stays by settlement
100,000 and more
50,000 to 99,999
10,000 to 49,999
5000 to 9999
Less than 5000
Tourist intensity
= number of overnight stays in settlement / population of settlement
100 and more
10 to 99
Less than 10
Type of tourist area, proportion of domestic and foreign tourists
Foreign
Domestic
Seaside tourist area
Health tourist area
Mountain tourist area
Other tourist area
Popular areas for outdoor recreation
Very popular for mountaineering, hiking, and excursions
Valley very popular for observing and enjoying nature
Attractive winegrowing landscape
Guiding wine road
River section very popular for kayaking and canoeing
Organized swimming area on lake
Ski centers by length of ski trails (in kilometers)
10.0 and more
3.0 to 9.9
Less than 3.0
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Matjaž Jeršič
© Geografski inštitut Antona Melika ZRC SAZU, 2004
ADRIATIC SEA

◄ *Figure 1: Tourism and recreation in 1996.*

particularly beside Lake Bled and Lake Bohinj. At that time, Slovenia was a tourist destination for visitors coming mainly from Austria, Germany, and Hungary. After World War I, visitors from the larger cities in the former Yugoslavia gradually appeared as well.

Slovenia's tourist gravitation area expanded after World War II, mainly the result of new highway connections across the Eastern Alps, as well between northern Italian cities and Slovenia. Highways opened the possibility for several important tourist road flows from more remote parts of Western Europe. The international Ljubljana-Brnik airport also contributed to the extension of the Slovenia's tourist gravitation area in the 1960's. However, Slovenia was not only a destination area for international tourist travels; at the same time, it was also an important transit tourist area. A great number of tourists from abroad bound for the Mediterranean coast of southern Europe (the coasts of Croatia and Greece) only passed through Slovenia.

The development of tourism in Slovenia after World War II is evident from the following indicators of tourist overnight capacities and tourist traffic. There were three major periods of tourist development: after World War II to the end of the 1960's (tourist traffic orientated mostly on domestic tourists), between 1970 and 1990 (the peak of tourist traffic), and after 1990 (a decrease in tourist traffic caused by the war in the Balkans).

- From 1953 to 1990, the number of all tourist beds increased from roughly 30,000 to 90,000. In 2003, we had around 80,000 tourist beds, 32% in hotels.
- In the same period, the total number of overnight stays increased from 1.1 to 9.2 million (in 1986). After the beginning of the war in the Balkans, they dropped to 5.8 million (in 1996). In 2003, we had around 7.5 million overnight stays.
- The average number of overnight stays is the highest at health resorts (4.9 days) and seaside resorts (4.1 days); the average for Slovenia is 3.4 days.
- The increasing significance of new types of tourism (short-term trips, transit tourism, winter tourism) became important particularly after the 1970's. Thus the seasonal concentration of tourist traffic became less acute (around 42% of overnight stays are recorded from June to August).

International tourist flows in the last four decades established tourist starting points for Slovenia principally in the sphere of Western and Central Europe. Parallel to this, in the 1980's an important proportion of tourists (around 30%) came from former Yugoslav republics, especially Croatia and Serbia. After the war in the Balkans, the proportion of tourists from former Yugoslav republics dropped drastically to just 6%. In 2003, foreign tourists accounted for about 56% of overnight stays in Slovenia, coming mostly from Germany (10.8%), Italy (9.7%), Austria (9.2%), Croatia (3.5%), Great Britain (2.7%), The Netherlands (2.6%), Hungary (1.4%), the Russian Federation (1.3%), and elsewhere.

Characteristics of Foreign Tourists in Slovenia

The results of a survey in the 2000 summer season show the following:

- 64% of foreign tourists stated that holidays were the main reason for coming to Slovenia, 17% came for business and educational reasons, and 11% were in transit.
- Tourists were also asked about their motives for coming to Slovenia. They were drawn to Slovenia mostly by its natural attractions (25%), tranquility and possibilities to rest (19%), and the climate (17%). Only 8% of the tourists came due to »low« prices.
- 56% of the tourists came to Slovenia by car or van, 14% by bus, and 18% by plane. The proportion of tourists travelling by car is highest for tourists from Croatia and Italy, while the proportion of tourists using buses is over one fifth for tourists from Austria and Germany.

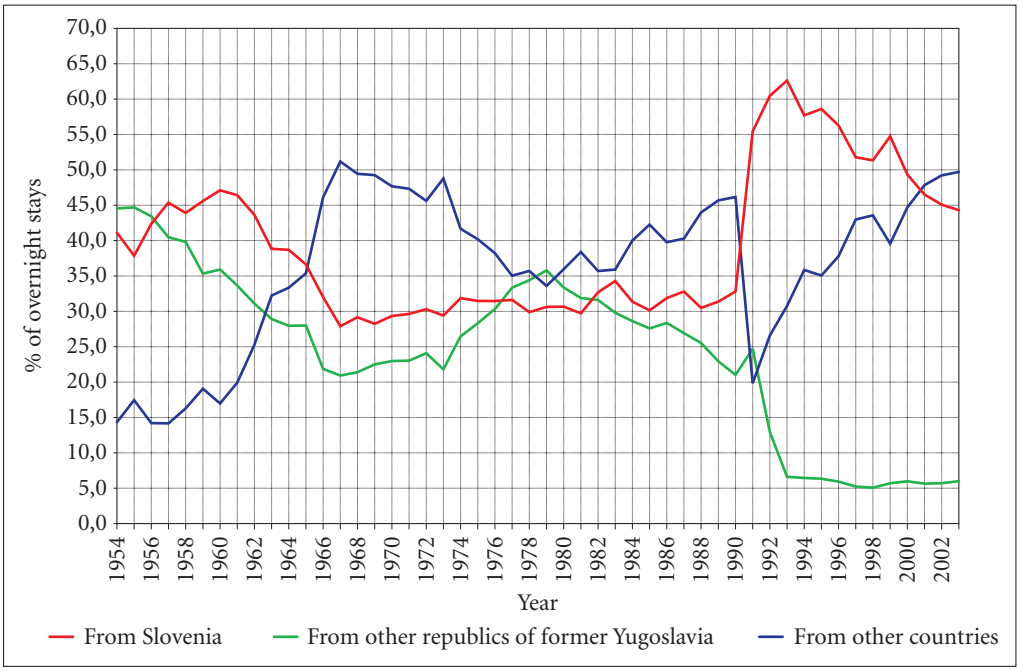


Figure 2: Share of overnight stays in Slovenia by origin of tourists.

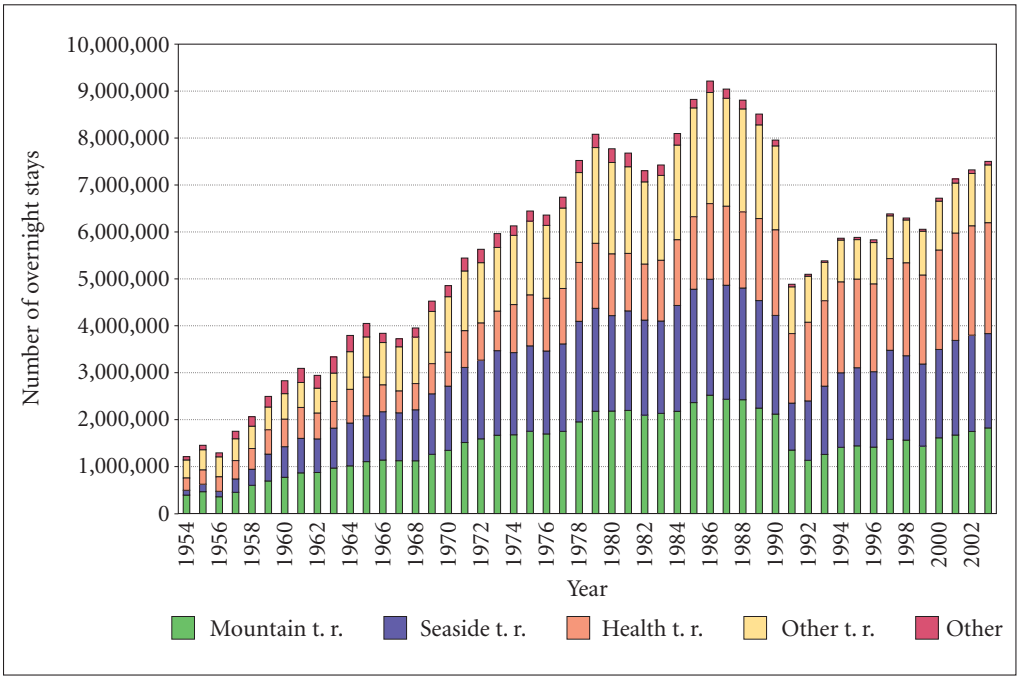


Figure 3: Number of overnight stays in Slovenia per resort type.

- Over of third of the tourists came to Slovenia with the assistance of travel agencies. In deciding to spend holidays in Slovenia, the most important factors were personal experiences (39%) and recommendations from friends (31%). Less than 20% of the tourists used the Internet to organize holidays in Slovenia.
- 80% of foreign tourists stayed in hotels and spent on average 3.1 days in Slovenia.
- Almost half of the foreign tourists were middle-aged. 45% were travelling in pairs, and three quarters stated that they live in cities with over 200,000 inhabitants.

Almost three quarters of the tourists would spend their holidays in Slovenia again, and only 3% would not. More than half of the tourists gave the best mark in the evaluation of the hospitality of the Slovenes and the feeling of personal safety during the stay. More than 40% of the tourists evaluated very positively the peace and quiet, the possibility of communicating in foreign languages, and the quality of the environment. The most negative marks were given to arrangements made for entertainment, shopping opportunities, and the quality of roads in Slovenia.

Types of tourist resorts in Slovenia

The vacation travels of tourists have been oriented particularly to three destination areas: the submediterranean region, the alpine region, and the health spas of eastern Slovenia.

Mountain tourist resorts were at first largely devoted to summer vacations, and hiking and mountaineering were the predominant forms of tourist recreation. Their growth was made possible by the widespread network of well-marked mountain trails (8,700 km) and 160 alpine lodges.

When downhill skiing became popular as a form of mass recreation after the 1960's, interest was aroused in the construction of skiing infrastructure at higher altitudes. Two opposing currents of Slovene public opinion evolved: one was inclined to the megalomanic development of tourist infrastructure while the other strove to preserve the natural and cultural landscape. These opposing interests were spatially demarcated in a formal way by declaring the central part of the Julian Alps a protected area (Triglav National Park). Thus, winter sports tourism has remained limited to mountainous areas outside the central Julian Alps.

Kranjska Gora is the scene of World Cup alpine skiing, and on Mount Kanin, only an hour's drive from the coast, it is possible to ski almost into summer. Below Mount Kanin is the Soča River valley and the resort town of Bovec where the world's best kayakers and canoeists compete. Lake Bohinj, Slovenia's largest lake, is found in Triglav National Park. At the edge of the park lies the world-renowned tourist resort of Bled and its lake. In the middle of the lake is an island with a 17th century pilgrimage church. Bled is the third largest tourist resort in Slovenia with almost 7% of all overnight stays.

Seaside tourist resorts initially had the function of health resorts, but after the 1950's they became typical seaside swimming-oriented resorts. This specific swimming function limited the tourist season to the summer months. After the 1980's, the growing popularity of recreation in the vicinity among the residents of larger towns relatively close to the coast and the widening of tourist offer by building facilities and introducing services for congress tourism, nautical tourism (there are 3 marines), etc., have mitigated the seasonal pattern.

The center of tourism on the coast is Portorož, the largest tourist resort in Slovenia (with almost 15% of all overnight stays). It offers numerous modern hotels, a marina, and an airport. Close to Portorož are Piran, Izola, and Koper, three of Slovenia's oldest coastal towns with medieval cores and a rich architectural heritage. Behind the coast is the world-famous karst region. First mentioned in the 13th century, Postojna Cave is one of the most popular caves in Europe with more than 26 million visitors so far. The Škocjan Caves are on the UNESCO List of Natural and Cultural World Heritage Sites.

Health resorts developed before World War II around springs of thermal and mineral water where no additional pumping was required. After the war, several new springs were developed for use by drilling.

Between 1945 and 1960, health resorts were primarily intended for the so-called »social« tourism and health care, and only after the 1960's were they included in the international tourist offer more extensively.

After the 1990's, Slovenia's spas and health resorts have widened their tourist offer from the prevalent specialized medical service to include more varied recreational activities (swimming, tennis, golf, etc.) and wellness programs and thus became the most important tourist resorts in Slovenia (with around one third of all overnight stays). Among the world-renowned health spas in Slovenia are the Rogaška Slatina Health Resort with 400 years of tradition, the Radenci Health Resort, the Moravske Toplice Health Resort, and the Čatež Thermal Spa, the second largest tourist resort in Slovenia with 7% of all overnight stays.

Tourist sites that are not dependent on natural landscape potentials such as historic, economic, administrative, and transport canters comprise an important group. These are largely concentrated in cities. Ljubljana, the capitol of Slovenia, is the fourth largest tourist site in Slovenia (with 5.5% of all overnight stays).

In the last twenty years, a variety of new tourist offers has appeared. Tourism in villages and on farms is well developed throughout Slovenia. Castle-hotels are also particularly attractive to tourists. Very important for the tourist offer are congress centers and a variety of cultural, sports, and fair events. Active holidays (golf, horseback riding, recreational fishing, rafting, etc.) are increasingly popular. Slovenia has also ten casinos; the most important is in Nova Gorica.

Along with vacation tourist flows, short-term travel flows have begun to occur in Slovenia more and more, particularly the flow of visitors from towns lying along the Italian border, for whom Slovenia's landscape had always represented an attractive nearby recreation area.

Conclusion

After this brief review, the following geographical characteristics of tourism in Slovenia can be listed:

- Tourist sites in Slovenia depend on a variety of natural and cultural tourist amenities that have characteristically marked individual types of resorts.
- The geographical position of Slovenia has influenced the development of a rather large tourist gravitation area, and at the same time, different forms of tourism (vacation or stationary tourism, excursions, transit tourism).
- The situation in the Balkans influenced tourist flows and decreased the tourist traffic, particularly from the former Yugoslav republics.
- Owing to its small tourist market (compared with the neighbouring countries), tourist development in Slovenia has never led to »industrial tourism«. Therefore, the pressures on the environment and the problems of concentration that might occur as a result of advanced tourism are not acute, except in individual cases.
- The essentially positive aspect of Slovenia's tourism (Slovenia's natural and cultural landscape as a precondition for outdoor recreation) offers further possibilities for development in the future.

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REGIONAL DEVELOPMENT IN SLOVENIA

Simon Kušar
Janez Nared

Trends toward the unification of space have been an ever-present historical phenomenon and were the consequence of the belief that the power of a state depends on the number of its population since they pay taxes and serve in the army. Today, unification is driven by economics. The common economic space formed by the European Union is thus an attempt to overcome European diversity and create the necessary mass of consumers. However, a common economic space does not necessarily mean equal conditions for individual national economies or more balanced development.

The European Union faces great differences in achieved levels of regional development. In accordance with the »core-periphery« theory, it is usually divided into the central more developed part that includes Belgium, Denmark, Luxemburg, Germany, The Netherlands, and Great Britain and other countries marked by slower or even stagnating development including Greece, Portugal, Spain, and the ten new members. The differences in the level of regional development achieved between individual members of the European Union are largely due to varied physical-geographical factors, different historical circumstances, political conditions, and economic development.

On May 1, 2004, the European Union experienced a major change. Its previous fifteen members were joined by ten new members: Cyprus, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Malta, Poland, Slovakia, and Slovenia. Each of these faces unique regional development problems. Here, we should not forget several common factors of regional development linked to their geopolitical circumstances in the 20th century. For several decades, the majority of the new joining members have been developing in the framework of a central planning system and a socialist social system that emphasized the great importance of industry but forgot the fact that development is a constant factor and it cannot be based only on the ruthless exploitation of natural and human resources. However, it would be unjust to mention only the negative factors. Economic development after World War II also brought development in the social and infrastructure spheres.

Slovenia, which with its 20,273 km^2 is one of the smallest countries in the expanded European Union, developed historically in the framework of the Habsburg Monarchy for a long time as a less developed peripheral region. The importance of the territory populated with Slovenes increased with the construction of the Vienna–Trieste railway in the middle of the 19th century, and the rapid economic development of the once mostly rural provinces began. From the end of World War I until 1991, Slovenia was the most developed part of the various Yugoslav states (Kingdom of SHS, Kingdom of Yugoslavia, Socialist Federal Republic of Yugoslavia). The independence of Slovenia in 1991 brought a brief economic stagnation, but by the middle of the 1990's, stagnation and regression were replaced by growth and development in all fields.

Today, Slovenia is a member of the European Union. The degree of its achieved development can be compared with that of other members of the European Union on the basis of a comparative analysis of variables illustrating socioeconomic, spatial, and environmental characteristics. Modern regional policy sees potentials for more balanced regional development primarily in stimulating the development of the information society, technologically demanding industrial branches, research and innovations, and in the increase of human resources. For a comparative analysis, the following variables were selected: Gross Domestic Product according to buying power per capita in EUR, real growth of the GDP relative to the previous year, the rate of inflation, the proportion of funds in the GDP devoted to research and development, the number of patents registered at the European Patent Office per

million inhabitants, the number of university graduates in the field of science and technology per 1,000 inhabitants aged 20 to 29, the level of unemployment, the growth of employment, and the proportion of households with access to the Internet.

Table 1: Individual indicators of regional development in the European Union from 2001.

Country	GDP per capita	Growth of GDP (2000–2001)	Inflation	R & D	Patents/ million inhabitants	University graduates	Level of unemployment	Growth of employment	% of households with Internet
Austria	26,140	0.8	2.3	1.9	174,150	7.3	3.6	0.7	46.2
Belgium	24,970	0.6	2.4	2.17	151,790	10.1	6.7	1.4	34.7
Cyprus*	18,190	4	2	0.27	14,464	3.7	4.4	–	20
Czech Republic*	14,160	3.1	4.5	1.22	10,701	5.6	8	0.4	11
Denmark	26,930	1.6	2.3	2.4	211,046	12.2	4.3	0.4	58.9
Estonia*	9,000	6.5	5.6	0.78	10,961	7.3	11.8	0.9	9.8
Finland	24,270	1.1	2.7	3.41	337,777	17.2	9.1	1.5	48.1
France	24,470	2.1	1.8	2.23	145,337	20.2	8.5	1.8	26.2
Greece	15,680	4	3.7	0.64	7,721	–	10.4	–0.4	11.7
Ireland	27,480	6.2	4	1.17	85,551	21.7	3.9	2.9	46.2
Italy	23,380	1.8	2.3	1.11	74,650	6.1	9.4	1.9	32.9
Latvia*	7,790	7.9	2.5	0.44	7,574	7.6	12.9	–	2.3
Lithuania*	8,690	6.5	1.3	0.69	2,435	14.8	16.1	–4	3.2
Luxemburg	45,360	1.2	2.4	–	211,330	–	2.1	5.6	43.6
Hungary*	12,020	3.8	9.1	0.95	18,971	3.7	5.6	0.4	–
Malta*	16,219	–1.2	2.5	–	10,194	2.7	6.7	2.9	–
Germany	23,460	0.8	1.9	2.51	309,864	8	7.8	0.4	37.9
The Netherlands	26,450	1.2	5.1	1.89	242,728	6.1	2.5	1.8	58.5
Poland*	9,550	1	5.3	0.64	2,522	7.4	18.5	–2.2	7.7
Portugal	16,510	1.7	4.4	0.85	5,497	6.4	4.1	1.4	23.4
Slovakia*	10,430	3.8	7.2	0.64	6,095	7.5	19.4	0.9	–
Slovenia*	**15,840**	**2.9**	**8.6**	**1.57**	**40,676**	**8.2**	**5.8**	**1.7**	**24**
Spain	19,670	2.8	2.8	0.95	24,109	11.3	10.6	2.3	23.4
Sweden	24,790	0.9	2.7	4.27	366,564	12.4	4.6	1.9	64.3
Great Britain	24,620	2.1	1.2	1.89	133,450	19.5	5	0.6	46.5
Average EU-15	**24,945**	**1.9**	**2.8**	**1.96**	**165,438**	**11.3**	**6.2**	**1.6**	**40.2**
Average EU-25	**19,843**	**2.7**	**3.6**	**1.5**	**104,246**	**9.9**	**8.1**	**1.1**	**30.9**

Key: – – no data; * – members of European Union since May 1, 2004.
Source: Eurostat. Structural Indicators. http://europa.eu.int/comm/eurostat/ (22. 4. 2004).

Gross Domestic Product is the most frequently used variable for establishing the level of development achieved. In 2001, with 15,840 EUR of GDP per capita, Slovenia reached 65% of the average GDP per capita of the old European Union (EU-15) or almost 80% of GDP per capita of the expanded European Union (EU-25). Its GDP ranks Slovenia at the top of the ten new members. A similar height of GDP per capita was also reached by Greece, Portugal, and Spain.

The growth of the GDP in Slovenia in 2001 was not as fast as in the majority of the other new members of the European Union, but it still exceeded the growth of the GDP in all of the old members. The level of inflation (8.6%) is still Slovenia's primary macroeconomic problem since it was higher only

in Hungary (9.1%). Regarding the proportion of the GDP devoted to research and development (1.57% GDP), Slovenia ranks immediately behind the most developed countries of the expanded European Union. With 40,676 registered patents per million inhabitants, Slovenia overtook all the new members of the European Union. Slovenia ranks among the medium-developed countries of the expanded European Union also on the basis of the variable of number of science and technology graduates per 1,000 inhabitants aged 20 to 29. The level of unemployment in the country (5.8%) should not present a major problem[1]. The information society is also well developed in Slovenia. A quarter of households had access to the Internet in 2001, and today the proportion is probably much higher. With this proportion, Slovenia overtook all the new members of the European Union, as well as Greece, Portugal, and Spain.

With its achieved level of development, Slovenia ranks among the most developed of the new members of the European Union and reaches the level of development of some of the less-developed members of the former fifteen. This is also proven by the cluster analysis made on the basis of the selected variables. Slovenia ranked in the same group as the Czech Republic, Greece, Italy, Hungary, Portugal, and Spain. However, we must point out that the actual development of Slovenia is even higher than indicated by the analyzed data. Due to the dominance of single-family housing, the relatively well-preserved environment, the developed infrastructure, and the quality of education, the quality of life in Slovenia is higher than it was presented with above mentioned figures. However, this does not mean that within the country there are no differences in the achieved level of regional development.

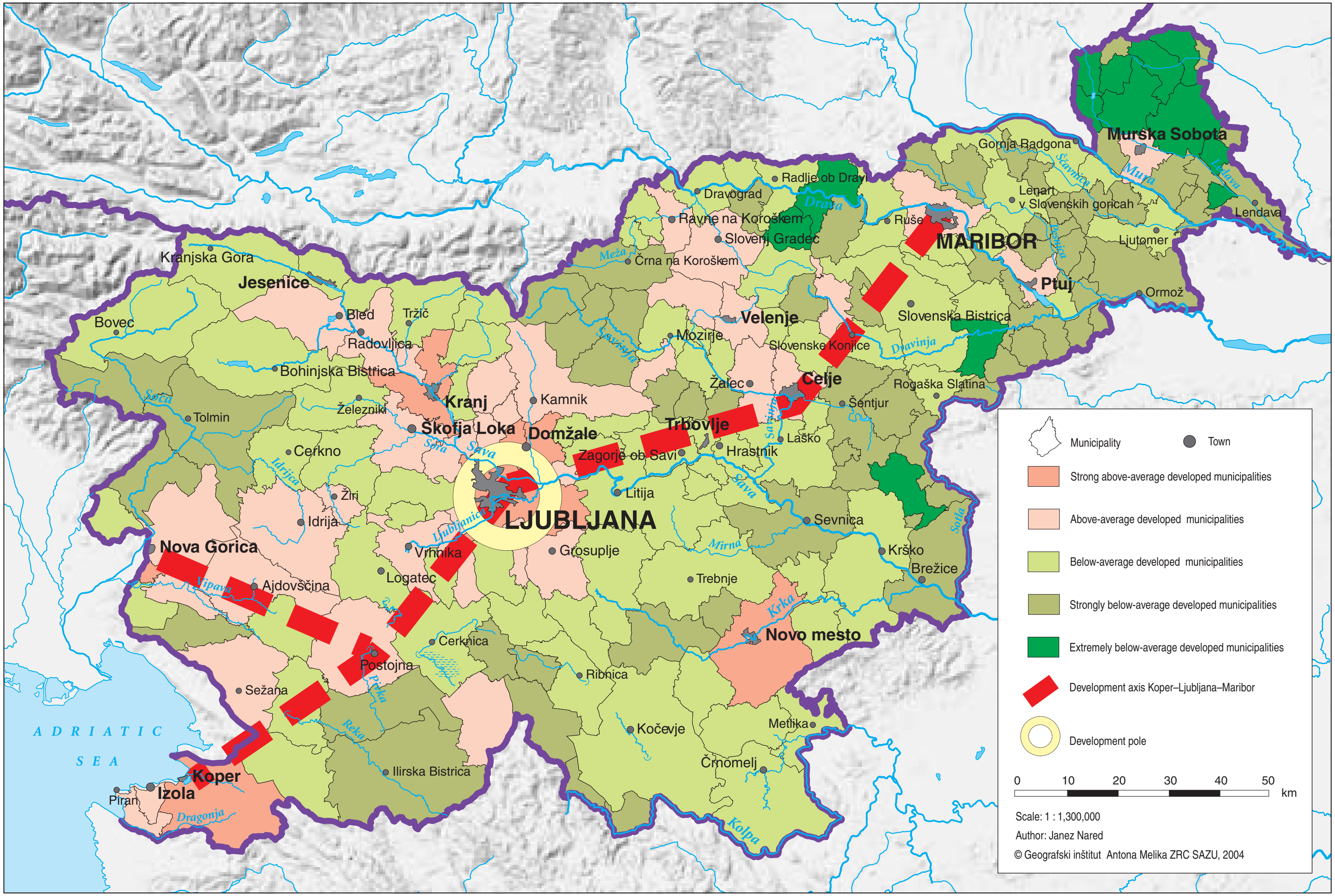
The structural changes that encompassed Slovenia following independence profoundly transformed Slovenia's spatial reality. Along with the events in the Balkans, the changed geopolitical situation and the transition from a planned economy to a market economy radically interfered with the previous economic, transportation, cultural, population, and political streams that had maintained the existing economic, settlement, and social structures in Slovenia. Suspended ties with the countries of the former Yugoslavia meant the loss of Slovenia's most important market and created problems for numerous companies whose production had been oriented toward the undemanding Yugoslav markets. Simultaneously, the establishment of new borders caused the appearance of extensive border areas that began to decline as a result of the separation from their functional complementary vicinity.

Numerous changes also occurred due to the social upheavals within Slovenia. Democratization and the introduction of a market economy combined with denationalization and privatization stimulated social differentiation, which manifested itself in the appearance of few entrepreneurial elites on one hand and numerous marginalized groups (unemployed) on the other. This phenomenon often appeared in the framework of regional (spatial) disparities, because a number of the structural changes had a regional (spatial) dimension. Individual monostructural areas could not adapt to the rapid changes, resulting in numerous bankruptcies and mass layoffs of workers. The difficult situation in which these regions found themselves was often further aggravated by the poor qualification structure of the labour force, the lack of flexible managerial and innovation structures, and a low level of entrepreneurial skills and initiative. The reaction of the government was also inadequate. Hoping to establish governing power structures as quickly as possible, the government often overlooked the problems of individual regions and branches of the economy and applied numerous intervention measures that gave only minimal results instead of creating a suitable entrepreneurial system.

The picture presented by the data on regions often blurs the view of the spatial distribution of individual phenomena. In order to obtain a comprehensive picture of regional development in Slovenia, we therefore analyzed the development of Slovene municipalities.

We combined the available data into three groups (Table 2) and evaluated them on the basis of the deviation from the average for each individual indicator. The first group attempts to encompass indicators of economic development to illustrate the economic structure and the labour market. The second

[1] According to Pečar (2002), the level of unemployment in Slovenia in 2001 was 11.6%.


Municipality
Town
Strong above-average developed municipalities
Above-average developed municipalities
Below-average developed municipalities
Strongly below-average developed municipalities
Extremely below-average developed municipalities
Development axis Koper–Ljubljana–Maribor
Development pole
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Janez Nared
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LJUBLJANA
MARIBOR
Murska Sobota
Celje
Kranj
Koper
Izola
Piran
Nova Gorica
Novo mesto
Velenje
Ptuj
Jesenice
Domžale
Škofja Loka
Trbovlje
Kranjska Gora
Bovec
Bled
Tržič
Radovljica
Bohinjska Bistrica
Tolmin
Železniki
Cerkno
Žiri
Idrija
Vrhnika
Logatec
Ajdovščina
Postojna
Cerknica
Sežana
Ilirska Bistrica
Ribnica
Kočevje
Grosuplje
Kamnik
Litija
Zagorje ob Savi
Hrastnik
Laško
Šentjur
Žalec
Mozirje
Slovenske Konjice
Slovenska Bistrica
Rogaška Slatina
Sevnica
Krško
Brežice
Trebnje
Metlika
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Dravograd
Radlje ob Dravi
Ravne na Koroškem
Slovenj Gradec
Črna na Koroškem
Ruše
Gornja Radgona
Lenart v Slovenskih goricah
Ljutomer
Lendava
Ormož
ADRIATIC SEA
Sava
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Soča
Idrijca
Vipava
Pivka
Reka
Dragonja
Ljubljanica
Savinja
Meža
Drava
Dravinja
Mura
Ščavnica
Ledava
Pesnica
Mirna
Krka
Sotla
Kolpa

◄ *Figure 1: The regional development in Slovenia and future perspectives.*

group connects population and settlement indicators to present the main characteristics of settling. In the third group we illustrate the standard of living of the population using the »Number of cars per 100 inhabitants« indicator.

The database foundations include data from the Statistical Office of the Republic of Slovenia, calculations by Pečar (2002), the Statistical Institute at the Faculty of Economics of the University of Ljubljana, and our own calculations.

Table 2. Structure of available data.

Group of indicators	Standards	Indicators
economic structure and labour market	economic power	value added per employee, number of enterprises per 1,000 inhabitants
	quality of work places	gross earnings per employee, taxable earnings per capita
	level of unemployment	registered unemployment rate
settlement and population structure	sociogeographical structure of municipalities	growth/decrease of population 1991–2002, age index
	physiognomic structure of municipalities	density of population
	economic-geographical structure of municipalities	proportion of farmers among active population, number of work places per 1,000 inhabitants, index of daily mobility
standard of living	level of motorization	number of cars per 100 inhabitants

Results

There are eight **strongly above-average developed municipalities.** Although few, relative to their economic influence they are very important for the vitality of the national economy. They encompass 5.7% of the territory and contain 23% of the population. Concentrated here are 35.7% of all jobs, which makes these municipalities important employment centers for the surrounding population. The job density is 551 per 1,000 inhabitants, while the population density is 329 people per km^2, which is more than three times the national average. They are marked by below-average population growth, which is a reflection of pronounced suburbanization. The relatively low level of unemployment also ranks among the important factors of their development.

As a rule, the municipalities in the group of **above-average developed municipalities** are areas of daily mobility to the previous group and municipalities with important regional and local centers, (Nova Gorica, Sežana, Idrija, Postojna, Celje, Slovenj Gradec, Maribor, Ptuj, and Murska Sobota). Together they encompass almost one fifth of the national territory and contain about 30.5% of the population. The population density (148.8 inhabitant per km^2) and job density (409 jobs per 1,000 inhabitants) are lower than in the previous group but still above the national average. A number of regional centers belong in this group, so it provides a high proportion (35.1%) of all jobs.

The most numerous group comprises **below-average developed municipalities** (74), which cover almost half of the national territory and contain 30.2% of the population. In spite of total size of the municipalities in this group, their area only provides just over 20% of all jobs. Job density and population density are already below average. It is interesting that the average population growth in this group is the highest (3.5%), which can be explained by the fact that several municipalities situated in the suburban hinterland of Ljubljana that experienced a high increase in population in the period following independence are found in this group.

Strongly below-average developed municipalities cover a quarter of Slovenia and lie mainly along the borders. These are traditionally backward, mostly agricultural areas with weak economic and population structures. The consequences of less favourable natural conditions and past emigration are sparse settling (50.7 persons per km^2) and a modest proportion of the population (14.3%). The proportion of work places is also low.

All the **extremely below-average developed municipalities** are found in eastern Slovenia. They encompass a good 4% of the territory and contain only 2% of the population with an average density of 44.5 persons per km^2. They are marked by a weak economic structure with few enterprises and a modest number of work places. The consequence of this is a high proportion of farming population and commuters. The population is aged and falling sharply (–4.6%) because the birthrate does not ensure normal reproduction and many people are also leaving these areas permanently.

A detailed evaluation of the economic structure of municipalities shows the economic bipolarity of Slovenia. Western and central Slovenia have an above-average economic structure broken by individual belts of below-average developed areas. On the other hand, extensive parts of eastern Slovenia are characterized by extremely and strongly below-average economic structures. The situation is of particular concern in the Podravje and Pomurje regions where only the municipalities of Maribor, Ptuj, and Murska Sobota rise above the national average.

The results of the analysis also show that the border areas are most limited in development, a reflection of their distance from influential centers and the fact that the borders in most cases are based on natural barriers. Similarly, natural conditions also greatly obstruct the more successful development of the countryside, as analysis shows on one hand that the majority of enterprises and jobs are located in just few centers and on the other that the sparsely settled regions stagnate economically.

Leaving the process of development to current trends would in our opinion lead into four-level segmentation of development space of Slovenia. Catching the globalization streams would by expectations succeed only in Ljubljana, which has been for long the leading development pole of Slovenia. Based on the among-city cooperation and on university centers new development axis could be formed on relation Koper/Nova Gorica–Ljubljana–Maribor (the fifth traffic corridor).

The active integration of the named axis would be possible only in close cooperation with Ljubljana. Other regions of Slovenia would be left to stagnation or to the step-by-step degradation, with the only exception of the individual regional centers.

Regional development in Slovenia is not left merely to the operation of market mechanisms since the state is playing an active role in the stimulation of a more balanced regional development. Regional policy has its roots in the beginning of the 1970's. Since this period, problem areas have received special assistance from the state. At the turn of the century, a reform of regional policy was made. Regional policy is now a constituent part of the national development policy. Slovenia will increase welfare of all of its population, but based on the principles of sustainable development. The aim of the National Development Program is to reduce the economic gap relative to the average of the European Union and stop the increase of disparities among Slovene regions. In encouraging a more balanced regional development in Slovenia, the common regional policy of the European Union will also play an important role. By 2006, Slovenia will acquire more funds from the Structural Funds and the Cohesion Fund, than it will have to pay into the common European budget. The majority of the total

295.3 billion EUR in the period between 2004 and 2006 will be devoted to the stimulation of (regional) development.

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SLOVENIA AND THE CHALLENGES OF SUSTAINABLE DEVELOPMENT

Dušan Plut
Katja Vintar Mally

Even before entering the European Union (2004), Slovenia faced the changing significance of developmental factors and the exhaustion of the previously existing development model, which subsequently led to its replacement with a sustainable development paradigm. Even though Slovenia did not form a national strategy of sustainable development, it explicitly strove for an equal treatment of the economic, social, and environmental dimensions of development in all the primary development documents, sector policies, and legislation (for example, the Strategy for Economic Development, the National Development Plan, environmental policy with the Environmental Protection Act and the National Environmental Action Program, regional policy with the Promotion of Balanced Regional Development Act and the Strategy of Regional Development of Slovenia, spatial planning policy, etc.). The realization of the principles of sustainable development, however, is limited just to sectors and is not comprehensive.

For the strategic assessment of the opportunities and risks of sustainable development, it is of key importance that in the framework of the expanded European Union (EU-25) Slovenia ranks among:

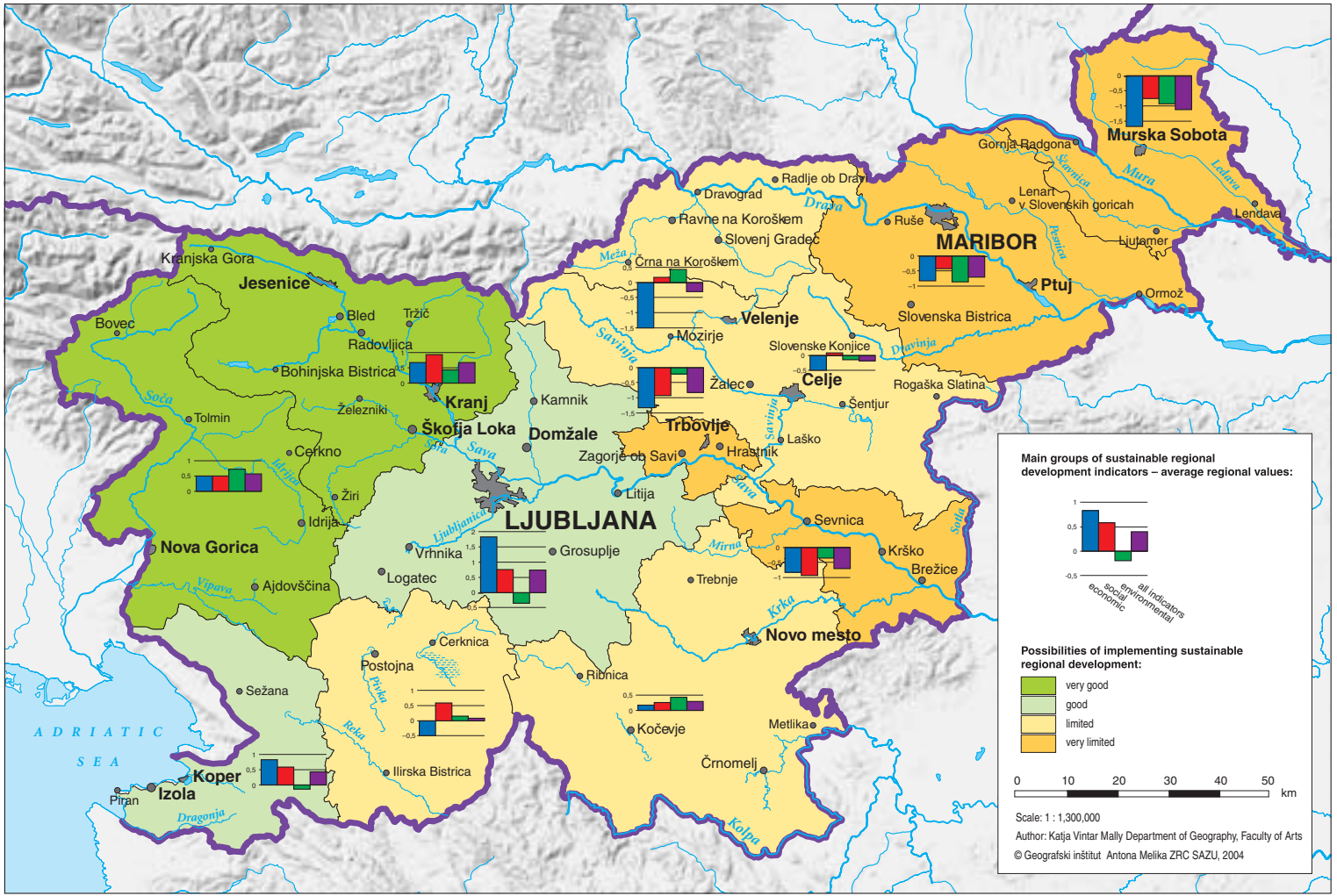
a. countries with medium-developed economies, with increasing interregional economic and social disparities also after gaining independence in 1991 and smaller areas of intensive and multilevel landscape degradation that at the same time are developmentally weak traditional industrial areas with structural problems; and

b. countries with gradually improving environmental legislation, moderate general pollution, above-average pollution of water sources, unregulated and problematic waste management, inappropriate use of space, various trends of population and economic pressure on the environment, and high material use and energy intensity (Špes 2000; Plut 2002; Poročilo 2003).

The increase of regional disparities and the continuation of the predominantly dispersed pattern of suburbanization and the simultaneous depopulation and overgrowth of marginal and higher areas of Slovenia has magnified pressures on the environment in the already heavily polluted and vulnerable valley-basin and coastal ecosystems (Plut et al. 2002).

A quantitative analysis and evaluation of thirty-two economic, social, and environmental indicators from the viewpoint of favourability for implementing sustainable development in twelve Slovene statistical regions responsible for the execution of regional policy draws attention to large interregional differences. According to the absolute difference between the average values of the best and worst ranked regions, these differences are greatest in the economic sphere (3.5) and substantially smaller in the social (1.83) and environmental (1.64) spheres (Vintar 2003). On the basis of the values for the three main development spheres and their average (i. e., indicator of sustainable regional development), the regions are classified into four groups relative to future possibilities of implementing sustainable development (Figure 1).

From the viewpoint of the wider European context, the concept of a balanced development in Slovenia is not being fully realized. In the last decade, steady economic progress (1995–2002: GDP growth from 61% to 69% of the average of the pre-May 2004 members of European Union (EU-15) has been accompanied by favourable social development (29th place among 175 countries relative to the human development index) with the extension of the average life span, the level of social protection, stopping the increase of income-inequality, and lowering of the level of poverty risk. However, the trends are


Murska Sobota
Gornja Radgona
Radlje ob Dravi
Dravograd
Ravne na Koroškem
Slovenj Gradec
Črna na Koroškem
Lenart v Slovenskih goricah
Ruše
MARIBOR
Lendava
Ljutomer
Ptuj
Ormož
Slovenska Bistrica
Velenje
Mozirje
Slovenske Konjice
Celje
Žalec
Rogaška Slatina
Šentjur
Trbovlje
Laško
Hrastnik
Zagorje ob Savi
Litija
Sevnica
Krško
Brežice
Trebnje
Novo mesto
Ribnica
Kočevje
Metlika
Črnomelj
Kolpa
Kranjska Gora
Jesenice
Bovec
Bled
Tržič
Radovljica
Bohinjska Bistrica
Železniki
Kranj
Tolmin
Škofja Loka
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Vrhnika
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Logatec
Ajdovščina
Nova Gorica
Cerknica
Postojna
Sežana
Koper
Izola
Piran
Ilirska Bistrica
ADRIATIC SEA
Mura
Drava
Meža
Savinja
Sava
Soča
Ljubljanica
Idrijca
Vipava
Reka
Pivka
Krka
Mirna
Sotla
Dragonja
Main groups of sustainable regional development indicators – average regional values:
all indicators
environmental
social
economic
Possibilities of implementing sustainable regional development:
very good
good
limited
very limited
0 10 20 30 40 50 km
Scale: 1 : 1,300,000
Author: Katja Vintar Mally Department of Geography, Faculty of Arts
© Geografski inštitut Antona Melika ZRC SAZU, 2004

◄ *Figure 1: Evaluation and implementation of sustainable development in Slovenian regions.*

less favourable in the environmental sphere due to the high energy intensity, unfavourable level of the growth of »dirty« industries, and more intensive agriculture (Poročilo 2004).

According to a series of environmental indicators, Slovenia ranks among the moderately polluted European countries with modest or exhausted stocks of non-renewable natural resources but with great landscape and biological diversity and various renewable natural resources that also perform indispensable ecosystem functions. Several wider industrial and mining areas of intensive and multilevel pollution stand out, which as a rule also lag behind in development. In the majority of cases, the forms of environmental degradation are not of an irreversible nature, which realistically allows for the clean-up of the environment or its polluted elements (Nacionalni 1999). The per capita consumption of natural resources and the generation of gas emissions and waste water per capita in Slovenia are substantially above the sustainable accepted planetary level but somewhat below the level of the EU-15 countries (Table 1). According to the majority of the presented key indicators of pressures on the environment per capita or per unit of surface, Slovenia ranked among the countries with moderate pressures in the period between 1999 and 2001 in comparison with the EU-15 countries.

A comparison of the key indicators of sustainable development for the EU-15 countries and Slovenia for the 1990's underlines the especially large consumption of material and energy per unit of GDP in Slovenia. A relatively large proportion of industrial branches consuming raw materials and energy and producing emissions intensively is characteristic of the Slovene export. According to Eurostat estimates, the emission of greenhouse gases in Slovenia increased between 1990 and 2001, while in the EU-15 countries it decreased by two percent. Slovenia is also marked by a profligate use of space (and the necessary extensive and burdening infrastructure and use of energy connected with it) because it uses three to five times more space per every new residence than densely populated Denmark or The Netherlands. Also, the proportion of the total protected area in Slovenia (around 10% of the country in 2003) is too small from the comparative viewpoint.

In the period following independence the quality of the environment and its components that are critically polluted are improving as a rule, but in general the pressures on the environment have increased slightly since the middle of the 1990's (Plut 2002).

The key developmental and environmental concern is the modest inclusion of environmental components in government policies, particularly in industrial, transportation, and agricultural policies. The existing government mechanisms for increasing the competitiveness of the business sector place environmental protection incentives in the background or include them in insufficient measure. One of the key hindering factors for the necessary reduction of energy and emission intensity is the large proportion of energy-intensive state-owned companies.

The principles of sustainable development and membership in the European Union demand the systematic and more consistent application of environmental principles and measures in national policy, in the behaviour of companies and institutions, and in the organization of the material life of the family and the individual. Maintaining the current pattern of environmental protection and environmental policy will weaken Slovenia's advantages and development opportunities.

Between 2005 and 2015, Slovenia will have to achieve the expected economic progress and the rise of welfare along with the more efficient use of its natural (environmental) capital, the preservation of nature, and a rise in the quality of the living environment. After 2010, due particularly to the exhaustion of environmental resources and the continuing (globally and locally) unacceptable consumption of natural resources and the resulting emissions per capita in Slovenia too a more determined transition to a developmental-environmental model of strengthened sustainability and the optimal preservation of the environmental capital of Slovenia and its regions will be necessary. Along with the anticipated technological development and the transformation into a more energy-efficient informa-

Table 1: Key synthesis and environmental indicators of EU-25 countries

	GDP ppp (2001) EUR/capita	Human development index (2001)	Ecological footprint (1999) global ha/person	Population density (1999) person/km^2	Total primary energy supply (2000) toe*/capita	Fertilizer consumption per agricultural land area unit (1999) tonnes/km^2	Number of cars per 1,000 inhabitants (1999)	Water exploitation (1999) %	Emission of CO_2 (2001) kg/capita	Municipal waste generation (2000) kg/capita
Austria[1]	26,140	0.929	4.73	97	3.51	7.11	495.5	3	8,150	556
Belgium[1]	24,970	0.937	6.72	310	5.57	19.66	448.2	43	12,392	534
Cyprus	18,190	0.891	–	82	3.22	13.74	340.8	27	–	677
Czech Republic	14,160	0.861	4.82	130	3.95	6.28	334.7	21	12,430	334
Denmark[1]	26,930	0.930	6.58	124	3.69	14.79	346.5	20	9,905	665
Estonia	9,000	0.833	4.94	30	3.32	1.90	330.8	1	12,307	462
Finland[1]	24,270	0.930	8.42	15	6.30	13.69	403.2	2	12,035	–
France[1]	24,470	0.925	5.26	107	4.24	15.90	468.8	18	6,825	530
Germany[1]	23,460	0.921	4.71	230	4.09	17.83	515.6	30	10,443	537
Greece[1]	15,680	0.892	5.09	80	2.66	5.20	254.5	7	10,187	372
Hungary	12,020	0.837	3.08	108	2.45	6.26	224.1	7	5,932	454
Ireland[1]	27,480	0.930	5.33	54	3.70	15.84	338.3	2	11,577	601
Italy[1]	23,380	0.916	3.84	191	3.04	10.89	555.8	29	8,032	502
Latvia	7,790	0.811	3.43	37	1.54	2.19	218.1	1	2,887	242
Lithuania	8,690	0.824	3.07	57	2.03	5.23	294.5	1	4,508	294
Luxembourg[1]	45,360	0.930	6.72	172	8.23	–	609.9	–	12,314	643
Malta	16,219	0.856	–	1219	2.10	7.92	470.7	109	–	481
The Netherlands[1]	26,450	0.938	4.81	383	4.73	24.15	401.3	9	10,901	613
Poland	9,550	0.841	3.70	120	2.33	8.28	240.2	20	8,529	–
Portugal[1]	16,510	0.896	4.47	109	2.41	6.20	493.7	11	6,310	453
Slovakia	10,430	0.836	3.44	110	3.23	3.63	229.2	4	7,678	316
Spain[1]	19,670	0.918	4.66	78	3.07	7.72	427.4	28	7,770	–
Sweden[1]	24,790	0.941	6.73	20	5.45	8.55	439.2	2	6,298	428
United Kingdom[1]	24,620	0.930	5.35	246	3.85	11.88	413.9	8	9,141	493
Slovenia	15,840	0.881	3.58	98	3.29 (3.20**)	15.72	427.6	2	7,904 *(7,332***)*	*584*
Slovenia ranking[2]	*17*	*17*	*5*	*11*	*12*	*19*	*16*	*4–7*	*9*	*17*

Source: *Environment*… 1999; *Living*… 2002; *Europe's*… 2003; *Human*…, 2003; Statistični …, 2003

Notes: [1] pre-May 2004 members of the European Union (EU-15); [2] place in EU-25 according to favourability for sustainable development;
– no data available; * tonnes of oil equivalent; ** National Energy Program (2003) data; *** emission of CO_2 in 1999 according to records of IPCC

tion society, the basic developmental and environmental goal of Slovenia is the stabilization of energy use by 2015 (except in the event of exceptionally high economic growth).

The key environmental goals and priority tasks in the field of environmental protection for Slovenia to achieve by 2013 are the following:

- Improving the quality of water sources, reducing the damaging consequences of droughts and floods and enforcing the sustainable use of water on the basis of the economic cost of water;
- Reducing the quantity of waste through changed production and consumer patterns, technological improvements, economic measures, advertising and informing the public, and increasing material use efficiency;
- Reducing the emission of greenhouse gases;
- Mitigating traffic pressures on environment;
- Preserving landscape and biological diversity;
- Reducing the degradation of the environment in wider areas of multilevel degradation (Zasavje, Mežiška Valley, the urban area of Celje, and the Šaleška Valley) and in smaller critically polluted areas;
- Accelerated integration of environmental requirements in sector policies and consumer patterns.

In parallel with the environmental requirements, economic interests will also be forced to confront demands for the abolition of poverty, the guarantee of social security and justice, and the general improvement of the quality of life. With its inclusion in European integration processes, its desire to rapidly achieve the level of the countries with the most developed economies, and to raise the competitiveness of its regions, this small but very diverse country will have to be very inventive in its search for opportunities of social and economic development within the existing environmental limitations.

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